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REVIEW
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C. A. I.
6 DEC 1954
FILE

HOLMES (F. O.). **The tendency of some types of Tobacco to escape infection by Tobacco-mosaic virus.**—Abs. in *Phytopathology*, 43, 9, pp. 475–476, 1953.

The results of an investigation [? at the Rockefeller Institute for Medical Research, New York] confirmed the report of Cuzin *et al.* [*R.A.M.*, 31, p. 404] that the susceptibility to tobacco mosaic virus of the Java Isère × Cabot tobacco variety is low. Furthermore, two genes formerly associated with other types of resistance to the virus were shown to determine similar tendencies to escape infection. The dominant gene *N*, controlling hypersensitivity, and a recessive gene requisite for tolerance, presumably Nolla's r_{m1} [cf. 17, p. 417], both confer this form of resistance. They were found to segregate independently of each other and to act additively when combined in a single plant. Plants carrying the two genes develop only a few small, necrotic, primary and no secondary lesions after inoculation with the distorting strain of the virus [33, p. 121 *et passim*].

WYND (F. L.). **Preparation of radioactive Tobacco mosaic virus.**—*Lloydia*, 16, 4, pp. 233–251, 5 figs., 1953.

The author points out that the practical control of virus diseases of plants would be greatly facilitated if knowledge of the mechanism by which virus particles multiply were complete and states that his own work [cf. *R.A.M.*, 22, p. 328] has been based on the theory that virus particles arise as a product of an abnormal cellular metabolism. He then briefly discusses the biochemical nature of virus diseases and describes a method of preparing purified suspensions of virulent tobacco mosaic virus possessing sufficient radioactivity to permit their use as measurable reagents for studies based on their reinoculation into healthy plants. First, tobacco plants were grown in hydroponic culture low in phosphate for three weeks. Radioactive orthophosphoric acid was then added to the nutrient and seven days later each plant was sap-inoculated with the virus. Sixty-two days after inoculation the virus was recovered by differential ultracentrifugation. The purified virus suspension obtained had a radioactivity of 2·54 μ-curies per mg. of virus phosphorus. Electron photographs indicated that the recovered virus was probably pure.

PIRIE (N. W.). **Biochemistry department.**—*Rep. Rothamst. exp. Sta., 1952*, pp. 74–78, 1953.

Work in collaboration with F. C. BAWDEN on the initial infectivity of preparations of the Rothamsted strain of tobacco necrosis virus [*R.A.M.*, 30, p. 126; 32, p. 469] and the persistence of infectivity under different storage conditions have shown that treatments inducing destruction of the normal leaf nucleoprotein, e.g., ageing in the sap, treatment with chloroform, dialysis, etc., give a relatively stable preparation, whereas those that stabilize the normal protein, e.g., sap dilution, rapid cold working, additions of azide, etc., give a preparation that can be unstable. Thus, stability depends on the other components of the storage fluid. When the

normal concentration of ascorbic acid in sap is increased five times by the addition of 1 gm. per l., the resulting virus preparation is relatively uninfective and unstable, though when added to most types of preparation, the acid acts as a stabilizing agent. Azide preparations, however, are an exception; they lose infectivity more rapidly in the presence of ascorbic acid than in water.

CLARK (F.) & VOLK (G. M.). **Plant beds for flue-cured Tobacco.**—*Circ. Fla agric. Exp. Sta.* S-44, 18 pp., 12 figs., 1952.

This circular contains notes on the control of blue mould [*Peronospora tabacina*: *R.A.M.*, 33, p. 453 and above, p. 640] and damping-off [33, p. 452] in tobacco seed beds. Recommendations for the latter disease include 1 lb. yellow cuprocide or 3 to 4 lb. wettable spergon per 100 gals. water at 3 to 4 gals. spray per 100 sq. yds. when it appears.

LUCAS (G. B.) & PERSON (L. H.). **Factors influencing oospore germination in Peronospora tabacina.**—*Plant Dis. Reptr*, 38, 4, pp. 243–244, 1954. [Multilithed.]

Most of this information on the factors influencing oospore germination in the tobacco blue mould fungus (*Peronospora tabacina*) has already been noticed from another source [*R.A.M.*, 33, p. 505].

PETERSEN (E. L.) & NAYLOR (A. W.). **Some metabolic changes in Tobacco stem tips accompanying maleic hydrazide treatment and the appearance of frenching symptoms.**—*Physiol. Plant.*, 6, pp. 816–828, 1953.

In work at Connecticut Agricultural Experiment Station it was found that the new growth of tobacco plants following treatment with maleic hydrazide was similar to that of frenched plants [cf. *R.A.M.*, 32, p. 153]. In treated and frenched tobacco leaves the protein content was lower, while the free ammonia, glutamine, asparagine, and free amino acids were higher than in healthy plants. All the individual amino acids were more abundant in treated and frenched plants, whereas isoleucine showed the greatest relative increase in the frenched sample and leucine in the treated leaf. Further dissimilarities included high calcium and manganese concentrations in treated plants, compared with high potassium in frenched ones. It is suggested that both maleic hydrazide and the frenching factor affect normal carbohydrate metabolism in the tobacco plant, possibly inducing the use of protein as a respiratory substrate or inhibiting its formation, and may interfere with mitosis.

FINLAY (K. W.). **Inheritance of spotted wilt resistance in the Tomato I. Identification of strains of the virus by the resistance or susceptibility of Tomato species.**—*Aust. J. sci. Res.*, Ser. B, 5, 3, pp. 303–314, 1 pl., 1952.

Previous investigations at the Institute of Agriculture, University of Western Australia, suggested that several genes controlled the inheritance of resistance in tomatoes to the spotted wilt virus [*R.A.M.*, 30, p. 19 and next abstract] and that the presence or absence of some strains of the virus in local complexes also affected the reaction of varieties such as Pearl Harbour, Manzana, and Rey de los Tempranos. The present investigation [cf. 33, p. 325], begun in 1949, was based on the hypothesis that a gene complex for resistance to spotted wilt exists, each gene controlling resistance to one or more individual strains. Accordingly, ten distinct Australian strains [32, p. 648] were differentiated on five tomato types by Norris's method (*Bull. Coun. sci. industr. Res. Aust.* 202, 1946): tip blight TB_1, TB_2, and TB_3, necrotic N_1 and N_2, ring spot R_1, R_2, and R_3, and mild M_1 and M_2. Their chief reactions are as follows.

Inoculated with TB_1, *Lycopersicon peruvianum* developed numerous small, necrotic lesions on 26 out of 27 plants; *L. pimpinellifolium* and Rey de los Tempranos developed necrotic local lesions with gradual systemic spread but outgrew infection after 35 to 40 days. These three species were therefore rated as resistant. Pearl Harbour and Manzana, rated as susceptible, exhibited necrotic local lesions after 6 to 7 days and died within 21.

L. peruvianum was immune from TB_2 and all the other wilt strains tested. *L. pimpinellifolium*, susceptible to TB_2, displayed necrotic local lesions, diffuse mottling and interveinal necrosis on the young leaves, and died after about 35 days. Rey de los Tempranos and Manzana (both resistant) reacted similarly but less severely and recovered after about 35 to 40 days. Pearl Harbour (susceptible) gave a typical tip blight reaction, dying after 14 to 16 days.

Resistance to TB_3 was displayed by *L. pimpinellifolium*, necrotic local lesions developing, with mild chlorotic systemic infection in three plants; no spread was evident up to 30 days after inoculation. Rey de los Tempranos (susceptible) reacted as it did to TB_1 and TB_2, but also developed chlorotic mottle, severe interveinal necrosis, and necrotic spotting on very young leaves. Death ensued after 25 to 30 days. Pearl Harbour (resistant) outgrew local necrotic lesions, systemic necrotic spotting, and stunting of the growing tip after 28 to 32 days. Manzana (susceptible) developed systemic necrosis and died after 16 to 18 days.

L. pimpinellifolium (resistant to N_1) developed indefinite yellow spots sometimes surrounded by fine, concentric, yellow rings. Three plants developed vein-clearing and downward curling of the young leaves but outgrew it. The symptoms on Rey de los Tempranos and (rather more severe) Manzana (both susceptible) were necrotic spotting, systemic vein-clearing, downward curling of the leaves, stunting of the growing tip, and small, yellow-ringed fruits. Pearl Harbour (resistant) reacted with mild, indefinite, yellow spotting and diffuse mottling.

L. pimpinellifolium (resistant to N_2) developed necrotic, yellow ring spots but no systemic infection. Rey de los Tempranos (resistant) showed indefinite yellow mottling, ring spots, necrosis, and chlorosis but no systemic infection. Pearl Harbour and Manzana (susceptible) showed necrotic local lesions, bronze spotting, and chlorotic mottling, the upper leaves wilting and shrivelling slowly.

L. pimpinellifolium was immune from strains R_1, R_2, R_3, M_1, and M_2. Rey de los Tempranos and Manzana (susceptible to R_1) both reacted by chlorotic mottle and the latter by some necrosis of the young leaves. Pearl Harbour (resistant) showed vein-clearing, downward leaf curling, and diffuse mild mottling.

Rey de los Tempranos and Manzana (resistant to R_2) developed vein-clearing and downward leaf curling; Pearl Harbour (susceptible) reacted similarly but became dwarfed, with chlorotic, rugose, distorted leaves. Some young leaves had a bronze pattern or a definite concentric line ring pattern.

Rey de los Tempranos was immune from R_3, M_1, and M_2. Pearl Harbour (susceptible to R_3) showed diffuse mottling, vein-clearing, downward leaf curling, stunting, interveinal necrosis, and rugosity, while the resistant Manzana reacted by vein-clearing, downward leaf curling, and slight mottling.

Pearl Harbour was immune from M_1 and M_2. Manzana (susceptible to M_1) reacted by slight vein-clearing, systemic mild mottling, and slight rugosity and to M_2 (resistant) by slight mottling of the young leaves only.

The variable resistance of Rey de los Tempranos, Pearl Harbour, and Manzana may be explained as follows. It is suggested that the Hawaiian spotted wilt complex consists of all or some of the strains TB_3, N_1, R_1, M_1, and M_2, accounting for the high resistance of Pearl Harbour there [29, p. 540]. The New Jersey complex, however, may consist of any number of the strains TB_1, TB_2, N_2, R_2, R_3, M_1, and M_2 and would account for the apparent resistance of Rey de los Tempranos and Manzana [28, p. 91] and also the apparently higher resistance of Rey de los

Tempranos compared with Manzana. The occasional presence of TB_1 and N_2 accounts for the breakdown in resistance of Manzana but not of Rey de los Tempranos.

Cass-Smith (W. P.). **Spotted wilt of Tomatoes.**—*J. Dep. Agric. W. Aust.*, Ser. 3, 2, 4, pp. 521–522, 525, 4 figs., 1953.

Losses of tomatoes from spotted wilt virus in the main growing areas of Western Australia [see preceding abstract] vary from year to year and according to districts, but are heaviest in crops planted in late winter and spring. At present no satisfactory spotted wilt resistant commercial tomato varieties are available in Australia. In local trials with Argentine varieties, Rey de los Tempranos proved resistant and produced high yields, but the quality of the fruit is unsatisfactory, while the resistance of Manzana is not high. However, attempts are being made to cross these with local varieties. Control measures recommended are to grow from seed, to keep down weed growth, which may harbour the virus-carrying onion and carnation thrips [*Thrips tabaci* and *Frankliniella insularis*], and to spray the plants once or twice weekly with 0·1 per cent. DDT or tartar emetic foliage bait. Losses can be reduced by growing tall barrier crops such as maize round the tomato patch to catch migratory thrips. Such crops, too, must be frequently sprayed with DDT.

Tomato diseases and their control.—*J. Dep. Agric. Vict.*, 52, 6, pp. 285–288, 4 figs., 1954.

A further contribution to this series is concerned with the incidence, economic importance, and symptoms of four virus diseases of tomatoes in Victoria [cf. *R.A.M.*, 33, p. 507]. Spotted wilt [28, p. 538; cf. preceding abstracts] is the most severe disease in southern districts, where it causes losses of 50 per cent. or more in early plantings. Big bud [30, p. 215] is particularly serious in the north-eastern river valleys. Control of both diseases can only be effected by destroying the insect vectors [32, p. 105] and the weeds on which they breed. Mosaic is produced by two strains of the tobacco mosaic virus [cf. 24, p. 478], one causing a light and dark green mottle with puckering and malformation and the other a bright yellow mottle; neither is a serious problem in the State. Streak [loc. cit.] is comparatively rare in Victoria; the most severe damage is liable to occur when tomatoes already infected with a common form of tobacco mosaic virus become infected with potato virus X.

Dimond (A. E.), Davis (D.), Chapman (R. A.), & Stoddard (E. M.). **Plant chemotherapy as evaluated by the Fusarium wilt assay on Tomatoes.**—*Bull. Conn. agric. Exp. Sta.* 557, 82 pp., 3 figs., 2 diags., 8 graphs, 1952.

An assay method developed for measuring the chemotherapeutic potency of chemical compounds is described; the experimental basis for the procedure, the evaluation and interrelations of the grading methods, and the usefulness of the results are examined in detail. The method consists in applying the substances daily in solution or suspension for a standard treatment period at the maximum concentration that causes no visible injury to the plant. Bonny Best tomato plants are treated most effectively by applying the solution to the roots. The plants are then uprooted, washed, and inoculated with *Fusarium oxysporum* f. [*bulbigenum* var.] *lycopersici* [*R.A.M.*, 33, pp. 507, 566] by immersing the injured roots in a concentrated suspension of bud cells, repotted in fresh sand, and eventually graded for wilt severity by counting in each internode the number of large vascular bundles which have become discoloured. A disease index is computed by dividing the number of discoloured bundles by the total number of bundles observed. The ratio of the disease index in the treated plots to that in the control plots gives the chemotherapeutic ratio. The effects are more pronounced and uniform when the materials are applied to the roots than when injected into the stem.

Varieties moderately resistant to *Fusarium* wilt rank compounds in the same order as do varieties that are highly susceptible. Chemotherapeutic effects are generally short-lived and the treatments have to be repeated fairly frequently. Assay methods for assessing chemotherapeutic potency are reviewed and discussed. They are valuable for chemotherapeutant development in practice only if the field performance can be predicted from the assay.

There is no over-all relation between fungitoxicity of compounds and their chemotherapeutic potency, though compounds which are both highly fungitoxic and efficient as chemotherapeutants may act as systemic fungicides. The resistance of plants to disease may be changed by their nutrition and by altering their levels of reducing sugars.

There is a bibliography of 68 titles.

Doepel (R. F.). **Black spot or early blight of Tomatoes. Report of further spray trial.**—*J. Dep. Agric. W. Aust.*, Ser. 3, 2, 6, pp. 755–757, 1 fig., 1953.

Serious losses are caused to tomato growers by early blight (*Alternaria solani*) in the Geraldton district of Western Australia [cf. *R.A.M.*, 33, p. 507]. In experiments by the Department of Agriculture at Geraldton in 1953 dithane Z-78 ($\frac{3}{4}$ lb. to 40 gals. water) gave results equal to phygon XL in excellent control of early blight on tomatoes and also on potatoes. Unsprayed plots averaged 19·6 lb. of first grade tomatoes and 77 per cent. defoliation, dithane-treated plots 63·2 lb. and 29 per cent. Both dithane Z-78 and phygon XL were superior to the standard copper oxychloride spray (cuprox).

Kidson (E. B.) & Stanton (D. J.). **'Cloud' or vascular browning in Tomatoes. III. Some observations on leaves and fruit of cloud-susceptible plants.**—*N.Z. J. Sci. Tech.*, Sect. A, 35, 4, pp. 368–374, 1953.

Further observations on the 'cloud' condition in relation to the dry matter in leaves and fruits of tomato plants in New Zealand [*R.A.M.*, 33, p. 55] have shown that the damage caused to the vascular system by this condition is apparently associated with the changes in the fruit during ripening. Fruit picked green from susceptible plants showed little cloud when ripened, though it was of poor colour and texture compared with normal fruit ripened in the same way.

Hoffman (P. F.) & Zuckerman (B. M.). **Oak wilt fungus labelled with C^{14}.**—*Science*, 120, 3107, pp. 106–108, 1 fig., 1954.

In work at the Illinois State Natural History Survey, Urbana, a strain of *Endoconidiophora fagacearum* [*Chalara quercina*: *R.A.M.*, 33, p. 509] labelled with radioactive carbon^{14} and crossed with an unlabelled compatible strain produced radioactive ascospores. Twenty days after inoculation with labelled conidia the leaves of oak seedlings wilted and radioactivity could be detected in them. The radioactivity appeared to have no effect on the morphology or pathogenicity of the fungus or on the toxin produced by it.

Bauer (F.). **Neue Pilzschäden an der Roteiche.** [New fungal injuries on the Red Oak.]—*Forst u. Holz*, 8, 12, pp. 167–168, 8 figs., 1953.

Two hitherto unknown forms of fungal damage have been observed recently on red oaks in western Germany. A species of *Myxosporium* [cf. *R.A.M.*, 29, p. 536] attacks healthy young trees growing under favourable conditions. It is largely confined to the lateral branches, which acquire a pock-marked appearance after the rupture of the pustules and discharge of the spores, but when infection passes on to the leading shoots the results are more serious. The fungus may also be found on

leafless current-season shoots on trees over 80 years old, which presumably serve as a source of inoculum.

A species of *Phoma* infects the smooth surface of pole timber, which reacts by the development of a purple discoloration over several areas the size of the palm of the hand, 0·5 to 2 m. apart, followed by desiccation and callus formation.

FERNANDES (C. T.). **A Itália e Suíça defendem os seus castanhais.** [Italy and Switzerland protect their Chestnut groves.]—*Publ. Dir. Serv. flor. aqüíc., Lisboa*, 18, 2, pp. 135–158, 10 figs., 1951. [English summary.]

As a delegate to the FAO meeting of the Working Group for the Chestnut Tree, held in Rome in October, 1951, the author visited Italy and the canton of Ticino, Switzerland, where he collected information, herein recapitulated, on the measures in operation in those countries for the control of chestnut blight (*Endothia parasitica*) [*R.A.M.*, 33, p. 569].

DARPOUX (H.) & RIDÉ (M.). **Recherche de procédés de désinfection des Châtaignes contre l'Endothia parasitica (Murril) Anderson.** [Study of methods of disinfecting Chestnuts against *Endothia parasitica* (Murril) Anderson.]—*Phytiatrie-Phytopharm.* 1, pp. 17–20, 1952.

Further studies at Versailles, France, on the disinfection of imported chestnut seeds which might possibly be carrying *Endothia parasitica* [cf. *R.A.M.*, 31, p. 261] demonstrated that after (*a*) soaking in commercial formalin solution for one hour at 1 per cent., 30 minutes at 2 per cent., or ten minutes at 5 per cent., (*b*) treatment, after partial vacuum, with ethylene oxide for four hours at 400 gm. per cu. m., (*c*) soaking for 15 minutes in water at 45° to 47° [C.] then for at least ten minutes at 53°, and (*d*) autoclaving in a partial vacuum, all the spores adhering to the teguments were killed, but the methods are considered to be unpractical or too expensive and complicated.

TOKUSHIGE (Y.). **Witches'-broom of Paulownia tomentosa L. On the respiration of Paulownia infected with witches'-broom. Part I.**—*Bull. Kyushu Univ. For.* 19, pp. 71–82, 2 diags., 1 graph, 1950.
Parts II and III.—*Sci. Bull. Fac. Agric. Kyushu Univ.*, 12, 4, pp. 309–314, 315–319, 2 graphs, 1952. [Japanese, with English summary.]

This series of experiments in the Laboratory of Plant Pathology, Kyushu University, was designed to compare the leaf respiration of *Paulownia tomentosa* affected by witches' broom [*R.A.M.*, 31, p. 359] with that of healthy leaves, measured by means of a Warburg apparatus. In July, August, and November the quantity of oxygen consumed was, respectively, 70, 20, and 29 per cent. greater in diseased than in healthy leaves. The quantity of carbon dioxide produced was 36 and 40 per cent. higher in August and November and the respiratory quotient 13 and 8 per cent. greater, all these differences being significant or highly so. The metabolism of diseased leaves is therefore distinctly abnormal.

More sensitive tests with leaf disks confirmed these findings and indicated an incomplete oxidation in healthy *Paulownia* leaves. The respiration of diseased leaves appears to be chiefly aerobic.

MORIONDO (F.). **La ruggine curvatrice dei germogli sul Pino domestico.** [Twist rust of the shoots of common Pine.]—Reprinted from *Ital. for. mont.*, 6, 6, 4 pp., 2 figs., 1 diag., 1951. [French and English summaries. Received March, 1954.]

Early in May, 1950, a young reforestation planting of *Pinus pinea* on sandy soil at Duna Feniglia, near Orbetello, northern Italy, was attacked by *Melampsora*

pinitorqua [*R.A.M.*, 32, p. 408]. In many cases the whole plant withered, but in others the central shoot only was affected and the plant outgrew the infection by vigorous lateral development. The greatest amount of infection was near to a planting of white poplar (*Populus alba*) and by July the disease had affected most of the pines in this part, while further away seedling losses amounted to 40 to 50 per cent. or less. Uredo- and teleutosori, believed to be those of *M. pinitorqua*, were found on the poplar leaves, and it is assumed that the epidemic originated from this source.

Future pine plantings should not be made in the vicinity of poplars. In the present instance it is recommended that the poplars be destroyed, together with all the leaves and refuse, also the infected pines, which may harbour perennating mycelium of *M. pinitorqua*.

Ribaldi (M.). **Ricerche preliminari sopra un disseccamento delle piante di Pinus nigra Arn. var. austriaca Hoess.** [Preliminary studies on a wilt of *Pinus nigra* Arn. var. *austriaca* Hoess.]—*Boll. Soc. ital. Biol. sper.*, 28, 2, pp. 139–140, 1952.

During February, 1951, 10- to 15-year-old Austrian black pines (*Pinus nigra* var. *austriaca*) in a park in Turin, Italy, became partially or completely wilted and the leaves yellow or a mixture of light and dark green, according to the severity of infection. The phloem was necrotic and separated easily from the bark, while the wood beneath was coloured greyish-blue or black. Affected tissues yielded a fungus belonging to the Sphaerioidaceae, having brown macroconidia and hyaline microconidia, and apparently belonging to a new genus. As the disease may be of considerable phytopathological significance a watch should be kept for its appearance on Austrian pine in other forest regions of Italy.

Nobles (Mildred K.). **Studies in wood-inhabiting hymenomycetes I. Odontia bicolor.**—*Canad. J. Bot.*, 31, 6, pp. 745–749, 1 pl., 8 figs., 1953.

Odontia bicolor was recently found to be the cause of an important butt rot in living coniferous and broad-leaved trees in Canada [*R.A.M.*, 32, pp. 519–521], 45 infections of *Abies* spp. in the Upper Fraser Region of British Columbia having been erroneously attributed to *Polyporus* [*Polystictus*] *abietinus* [loc. cit.]. Up to the end of 1952, 184 cultures of *O. bicolor* were isolated from 13 species of trees. Isolates from *Pinus strobus*, *P. monticola*, larch, birch, *Picea glauca*, and *Tsuga heterophylla* produced on 2 per cent. malt agar colonies which were white, appressed, downy to finely woolly on the upper surface, and bleached, milky white on the reverse. There was no growth on malt agar plus 0·5 per cent. gallic acid, but a moderately strong to strong diffusion zone; with tannic acid the zone was weak to moderately strong, and the colony up to 2·5 cm. in diameter after one week. The hyphae in the advancing zone were hyaline, nodose-septate, measuring 1·8 to 4·6 μ in diameter. The numerous capitate cystidia on the aerial mycelium measured up to 15 μ long and up to 3·1 to 5 μ in diameter at the tip, bearing a coarse, jagged, crystalline cap up to 23 μ in diameter. The oidia, rare or apparently lacking, were about 1·8 μ in diameter and of variable length. For positive determination of *O. bicolor* eight key patterns need to be inserted in the numerical key previously published [28, p. 201]. In practice the fungus can generally be identified by its characteristic cystidia.

The decay is confined to the heartwood, infection taking place through the roots and advancing to the base of the trunk. The incipient stage is pink, red, or pinkish- or reddish-brown and the advanced stage white. Small, isolated pits, usually with white, fibrous contents, may elongate and coalesce to produce a stringy rot. Black flecks were present in all samples examined and white mycelial felts were common; cystidia could usually be detected in both of these.

EGGERTSON (E.). **An estimate of the number of alleles at the loci for heterothallism in a local concentration of Polyporus obtusus Berk.**—*Canad. J. Bot.*, 31, 6, pp. 750–759, 4 diags., 1953.

In a study of a sample of 24 fruit bodies of *Polyporus obtusus* collected from oaks at Chalk River, Ontario [*R.A.M.*, 27, p. 266], 39 alleles at each locus for heterothallism were found. From this it was estimated that there are probably 112 alleles in the total local concentration of the fungus. This agrees closely with a previous estimate for the Hymenomycetes in general [28, p. 582] and is interpreted as evidence that the local concentration of the fungus is not an isolated occurrence, as previously supposed, this view being further supported by recent records in several widely scattered areas in Ontario.

The infrequency of collections of *P. obtusus* is probably due to the fact that it can become established only on weakened hosts on poor sites where the timber is of little economic value and that it fruits only occasionally and then towards the end of summer when there is abundant moisture, the sporophores soon disintegrating or drying out and becoming inconspicuous. The author predicts that as a result of the Forest Disease Survey initiated in 1951 the fungus will probably be found to be generally distributed, particularly on red oak (*Quercus borealis*) in Eastern Canada.

KIMURA (K.). **On the sex of some wood-destroying fungi.**—*Bot. Mag., Tokyo*, 65, 767–768, pp. 145–148, 1952. [Japanese. Abs. from author's personal communication.]

Over ten monosporous cultures of *Polystictus abietinus* isolated from pine [*R.A.M.*, 22, p. 233] and of *Trametes vittata* and *Lentinus tigrinus* from cherry in Japan were paired in all possible combinations on potato dextrose agar slants. An examination of clamp formation revealed that *P. abietinus* and *L. tigrinus* were both tetrapolar [20, p. 613] and *T. vittata* bipolar.

HIGUCHI (T.). **Biochemical study of wood-rotting fungi. I. The enzymes responsible for the Bavendamm reaction.**—*J. Jap. For. Soc.*, 35, pp. 77–85, 1953. [Abs. in *Chem. Abstr.*, 48, 10, pp. 5940–5941, 1954.]

At the University of Gifu, Japan, a purified enzyme prepared from the mycelial mat of *Coriolus hirsutus* [*Stereum hirsutum*] was assigned to the laccase group. It also contained tyrosinase, a small amount of which probably combined with much laccase to cause the Bavendamm reaction [cf. *R.A.M.*, 33, p. 514]. The low-molecular fraction of Braun's native lignin was oxidized by the enzyme obtained from mushroom spawn.

FUKUZUMI (T.). **Phenol oxidase in wood-rotting fungi. I. Reaction of oxidase with the phenolic compounds.**—*J. Jap. For. Soc.*, 35, pp. 139–141, 1953. [Abs. in *Chem. Abstr.*, 48, 14, p. 8312, 1954.]

At the University of Tokyo, white and brown rot fungi were grown on an agar medium containing one of the following: tannic, gallic, and anthranilic acids, 1- and 2-naphthol, *o*-, *m*-, and *p*-cresol, catechol, hydroquinone, guaiacol, and vanillin. The colour of 1-naphthol was changed to purple by a white rot oxidase. When a phenol oxidase isolated from the mycelium of *Stereum umbrinum* [*R.A.M.*, 30, p. 97] was dispersed in water and added to a solution of 0·01 *M* naphthol with 0·2 *M* phosphate buffer at pH 7 and incubated for six days at 30° C. it produced a precipitate.

Carr (D.). **The air-drying and pressure-impregnation of New Zealand-grown Larch (Larix decidua), Douglas Fir (Pseudotsuga taxifolia), and Corsican Pine (Pinus laricio) natural round fence posts.**—*N.Z. J. Sci. Tech.*, Sect. B, 35, 6, pp. 481–497, 3 figs., 1 diag., 5 graphs, 1954.

A description is given of the experimental pressure-impregnation plant installed at Rotorua by the New Zealand Forest Service [*R.A.M.*, 29, p. 70; 32, p. 50; 33, p. 395], where the effects of temperature, initial air pressures, and oil pressures on the penetration of coal-tar creosote (N.Z. standard specification No. 401) into larch, Douglas fir [31, p. 2], and Corsican pine are studied. The heart-wood of the first two is usually more difficult to penetrate with liquids applied under pressure than the sapwood, the depth of which is an important consideration in natural round posts or poles.

For larch, pressures of 180 to 190 lb. per sq. in. for 5 hours are needed to confer satisfactory retention in full-cell treatment. A minimum penetration of $\frac{3}{4}$ in. in the ground-line area is suggested, with incising if necessary to achieve this. No difficulty was experienced in obtaining complete sapwood penetration of Corsican pine with 175 lb. pressure for 90 minutes.

Correct handling and drying, including air circulation, method of stacking, and humidity corresponding to the timber and species of wood used, before treatment with the preservative are very important. For impregnation purposes an average moisture content of 30 to 35 per cent. of the oven-dry weight of the timber results in satisfactory penetration. The rate of air-drying of the three species was determined. A preliminary heat sterilization treatment of pine poles is recommended to prevent decay by fungi common in pines during air-drying.

Beesley (J.). **Tests of pole treatments in Victoria, using Eucalyptus obliqua poles. Report of 1951 inspection and retreatments.**—*Progr. Rep. CSIRO For. Prod. Div., Sub-Proj. P. 6–3*, 17, 19 pp., 7 pl., 1953. [Mimeographed.]

An inspection of green *Eucalyptus obliqua* poles, 19 years after treatment, at Benalla and Belgrave, Victoria, Australia, showed that the best protection for sapwood against [unspecified] decay, splitting above ground, and termite attack was afforded by creosote oil [*R.A.M.*, 33, p. 328] applied by pressure impregnation or the open tank butt process [32, p. 50]. The heartwood was fairly well protected by combined oxyacetylene charring and creosote oil spray process, and by collar treatments with arsenious oxide.

Smith (Nancy M.). **Blindness in early Cauliflowers.**—*J. Minist. Agric.*, 60, 6, pp. 282–285, 1953.

Tests carried out in 1952–3 in the Horticultural Science Laboratories, University of Bristol, to determine the cause of blindness in early cauliflowers, showed incidence to be negligible in spring-sown, but up to 50 per cent. in autumn-sown plants. No definite conclusions were reached, but low temperatures when the plants were at a very early stage of growth may be a contributory cause. Further research is needed, but some loss may be avoided by paying careful attention to cultural details, such as the time of sowing and temperature, and to selection of varieties, because Remme, Meteor, and All the Year Round appear to be very susceptible as autumn-sown crops.

Kvíčala (B. A.). Влияние срока инфекции вирусной мозаикой урожай Сахарной Свеклы. [The influence of the date of mosaic virus infection on Sugar Beet yield.]—За соц. сельскохоз. Науку, Сер. A [*Socialist. agric. Sci. (Czechoslovakia)*, Ser. A], 3, 2, pp. 146–160, 2 diags., 4 graphs, 1954.

Field trials, to determine the influence of the date of infection of sugar beet with mosaic virus on yield, were carried out in 1951–2 in Czechoslovakia [*R.A.M.*, 33,

p. 133]. *Myzodes* [*Myzus*] *persicae*, previously starved and fed for 10 to 15 minutes in the glasshouse, was used to infect the plants at monthly intervals. Yield reduction was greatest in plants infected in May (39 to 67 per cent. root and 18·5 to 30·8 per cent. leaf reduction) and least in those infected in August (2·2 to 25 and 0). The total sugar loss (at 17 per cent. sugar content) ranged from 1·1 to 41·2 zentner [1 z. = 50 kg.] per ha. To avoid such losses intensive control measures, particularly of aphids, are recommended and the isolation of seed and steckling crops from beet fields.

Virus yellows studies discussed by specialists.—*Spreckels Sug. Beet Bull.*, 16, 5, pp. 38–40, 1 fig., 1952.

This discussion, to which L. D. Leach, C. W. Bennett, E. S. Sylvester, J. S. McFarlane, and F. J. Hills contributed, was concerned chiefly with the occurrence of a mild strain of beet virus yellows, similar to the European [beet yellows virus] disease, in California sugar beet crops [*R.A.M.*, 32, p. 228; 33, pp. 272, 400]. Its true importance cannot be assessed until it is known to what extent the yellowing is due to virus infection. Preliminary greenhouse observations at Riverside up to the first half of 1952 indicate that there may be a considerable range of susceptibility among sugar beet varieties, and possibly other hosts as well.

J. S. McFarlane stated that although no variety is resistant US 15 turns yellow earlier and more intensively than other commercial varieties in California. Of the breeding stocks tested at Salinas, a bolting-resistant inbred, NBI, has shown the least yellowing.

Baldoni (R.). **Prove di lotta contro la Cercospora della Bietola.** [Experiments on the control of *Cercospora* on Beet.]—Reprinted from *Industr. saccar. ital.*, 45, 1–2, 8 pp., 1952. [Received October, 1953.]

In June, 1951, experiments on the control of beet leaf spot (*Cercospora beticola*) were carried out in central Italy [*R.A.M.*, 20, p. 333] on a planting of Klein E receiving (*a*) six and (*b*) two applications of Caffaro powder (2 per cent. copper oxychloride) at 6 quintals per l. per ha. in liquid suspension and (*c*) six and (*d*) two applications of perenox solplant (0·6 per cent. copper oxide) at the same rate.

Although the yields from the treated plots were barely higher than those of other varieties they were better than usual, considering that Klein E is highly susceptible to *C. beticola* and ordinarily does not produce well under humid conditions such as prevailed at the time of the experiment. Caffaro was more effective than the oxide, particularly in its adhesive qualities. The six treatments of Caffaro were more effective than two, but three to four at 20 days' interval should suffice, particularly at less rainy times. Fields destined for early harvesting need be treated only once or twice, but the last treatment should come at least 30 days before removal. Normally 600 l. per ha. should be applied, but with high pressure pumps 300 l. of 3 per cent. Caffaro or 2 per cent. Bordeaux mixture is enough. The six treatments with Caffaro yielded a crop valued in sugar content (24 quintals per l. per ha.) and leaf and root weight (100 and 55) at about ten times the cost of treatment, and gave a higher polarization with a greater purity quotient. In early crops the sugar content in the untreated increased from 91·1 to 96·6 quintals between the first and second harvesting (13th August and 11th September), while the corresponding increase for treatment (*a*) was 103·4 to 125·2 quintals. For the final harvesting this treatment permitted the sugar content to remain constant, whereas in the untreated it decreased. The advantages of late harvesting are even more evident in the resistant Italian types.

Brewer (D.) & MacNeill (B. H.). **Preliminary studies in Ascochyta pisi Lib.**—*Canad. J. Bot.*, 31, 6, pp. 739–744, 1953.

In Ontario *Ascochyta* blight of peas, due largely to *A. pisi* [*R.A.M.*, 33, p. 332],

occurs throughout the canning crop area. The disease is characterized by the production of discrete lesions on the leaves and stems of young plants, each delimited by a halo of brown, necrotic tissue. Secondary attacks on the pods by pycnidiospores released from leaf lesions result in the infection of the developing seed.

In studies at Ontario Agricultural College, Guelph, it was found that foliage infection took place by direct penetration of the cuticle, with no appressorial formation. Subsequent colonization was successively subcuticular and intercellular, resulting in the collapse and death of the host cells. No haustoria were formed. Resistance may be due partly to the cuticular barrier as well as to a physiological factor limiting colonization after penetration. Pycnidial formation was symphogenous, bicellular spores being produced singly from conidiophores that grew out from the inner wall cells of the pycnidium. A single nuclear division occurred early in the ontogeny of the spore, so that most cells were binucleate even prior to germination. Spore production was marked by the almost complete depletion of the protoplasm in the fungal mass, vegetative development of the mycelium ceased, and the focus of infection became localized as a leaf spot. It is suggested that the production of this discrete type of lesion by *A. pisi* and certain other pycnidiaceous leaf-spotting fungi is a function of the developmental rhythm of the fungus rather than the expression of a specific host-parasite interaction.

Hagedorn (D. J.). **New Era, a recently developed disease-resistant canning Pea.**—Abs. in *Phytopathology*, 43, 9, p. 473, 1953.

A new Early Perfection type canning pea named New Era, recently developed at the University of Wisconsin, combines resistance to *Fusarium oxysporum* f. *pisi* races 1 and 2 [*R.A.M.*, 29, p. 396] and bean virus 2 [bean yellow mosaic virus: 30, p. 553] with other desirable characters.

[This information also appears in *Seed World*, 74, 9, p. 31, 1954.]

Viets (F. G.), Boawn (L. C.), & Crawford (C. L.). **Zinc content of Bean plants in relation to deficiency symptoms and yield.**—*Plant Physiol.*, 29, 1, pp. 76–79, 3 figs., 1954.

The occurrence of zinc deficiency symptoms in field-grown Red Mexican beans [*Phaseolus vulgaris*: *R.A.M.*, 31, p. 141] in Washington State soon after emergence was due to a low zinc content in the seed in addition to soil deficiency. The plants exhibited deficiency symptoms when the zinc content of mature leaves fell to 20 p.p.m. or less. The addition of zinc at the rate of 11·6 lb. per acre increased the zinc content of the beans, and yields were improved by the addition of zinc sulphate even in the absence of deficiency symptoms.

Johnson (H. W.) & Kilpatrick (R. A.). **Autumn treatment of Soybean seed.**—Abs. in *Phytopathology*, 43, 9, p. 476, 1953.

The results of the first series of experiments (1947–8) on the autumn treatment of soy-bean seed for spring planting at Stoneville, Mississippi, have already been reported [*R.A.M.*, 31, p. 220]. In further tests in the spring of 1951–2 [32, p. 603] stand improvement in the Dorman variety grown from seed placed in storage after treatment in the autumn with spergon, spergon SL, arasan, vancide 51ZW, arasan SF, and vancide 51 ranged from 13 to 24 per cent. These results are of practical significance, since autumn is a more convenient time than spring for farmers to treat the seed.

Cruickshank (I. A. M.) & Jacks (H.). **Seed disinfection. IX. Control of Onion smut (Urocystis cepulae Frost).**—*N.Z. J. Sci. Tech.*, Sect. A, 35, 4, pp. 390–393, 1953.

In further experiments on seed disinfection at the Plant Diseases Division,

Auckland, New Zealand [cf. *R.A.M.*, 33, p. 154], trials were carried out at Marshland, Canterbury, on soil of pH 4·95 to evaluate seed-dressings as compared with formalin-drip treatment (1 per cent. solution at 12 gals. per acre in the drills) against onion smut (*Urocystis cepulae*) [32, p. 656]. In the greenhouse materials based on thiram [33, p. 462] gave better control than calomel [mercurous chloride]. In field experiments in 1951 thiram (at 50 per cent. of seed weight) gave satisfactory control (28·5 per cent. mean infection), nearly equivalent to the formalin-drip (20·9 per cent.), compared with 80·5 for the untreated. In 1952 the corresponding results were 5·4, 8·2, and 66·1 per cent., respectively. Thiram also gave a significantly higher emergence percentage (88·1 to 92·7) than either untreated seed (62·1) or that sown with formalin-drip treatment (72·3).

To secure satisfactory control with thiram-based compounds, materials containing not less than 50 per cent. active substance at 50 per cent. seed weight appear necessary.

Stubbs (L. L.). **Lettuce mosaic virus disease.**—*J. Dep. Agric. Vict.*, 52, 6, pp. 259–264, 6 figs., 1954.

In varietal reaction tests with lettuce mosaic virus [cf. *R.A.M.*, 33, p. 10], known in Victoria since 1945, the chief winter variety, Imperial D, was hypersensitive [32, p. 534], the late winter and spring Imperial Triumph (Imperial 410) was very susceptible, but the summer varieties Pennlake and Great Lakes reacted mildly, possibly owing to symptom masking at high temperatures and favourable growing conditions rather than actual resistance. The recently introduced Jade (U.S.D.A. 3977) reacted even more severely than Imperial D. In limited tests the winter variety Imperial 404 developed less severe primary symptoms than the other winter varieties. Efforts are being directed towards the production of mosaic-free seed of the varieties best adapted to Victorian growing conditions. The disease is considered to be one of the most serious problems confronting the Victorian vegetable industry. Losses were heavy in winter and spring crops in 1951 and 1952, but in 1953 incidence was reduced by the use of locally produced seed, which appears to be free from infection. Every sample of imported seed was infected, incidence ranging from 0·5 to 2 per cent. in more resistant lines and from 4 to 7 per cent. in Jade. Barriers of maize plants between the lettuce rows appear to prevent spread of the disease.

Drummond (O. A.). **Da etiologia das rajas pretas das raizes da Mandioca.** [On the etiology of the black stripes of Cassava roots.]—*An. Congr. Soc. bot. Brasil, 1953*, pp. 57–66, 5 figs., 1953. [English summary.]

A troublesome disorder of cassava in Minas Gerais, Brazil, is marked by the development in the roots, 48 hours after lifting, of radial black stripes attributed to oxidation of the parenchymatous cells and xylem vessels. It was shown by comparative experiments to be avoidable by keeping the newly dug roots in water for a period not exceeding seven days, after which putrefaction set in. Other lots kept (*a*) in water containing 10 per cent. oxygen and (*b*) exposed to the air developed the characteristic dark striation after 24 and 48 hours, respectively.

Hewitt (W. B.) & Deep (C. J.). **Yellow mosaic of Grapevines and evidence of retention of the virus in the soil.**—Abs. in *Phytopathology*, 43, 9, p. 475, 1953.

Vine mosaic virus is characterized [in California: *R.A.M.*, 30, p. 402] by chlorosis of the leaves of the young shoot tips in 120 varieties and four species. Other symptoms include more or less extensive foliar mottling and blossom-shelling. Chip buds from vines with only one symptom type transmitted the entire complex on grafting into healthy vines. Infected plants mostly occur in compact groups,

from two of which the virus was shown by three seasons' mapping to have spread to bordering vines. Spring plantings of young, disease-free vines in soil from which old, diseased ones had been removed in the previous autumn developed yellow mosaic during the second season after planting, but no infection was observed in those planted at the same time outside but adjacent to the contaminated area.

Baldacci (E.). **Le virosi delle piante come malattie dello sviluppo e della moltiplicazione vegetativa — una esemplificazione : la degenerazione della Patata.** [Viroses of plants as diseases of growth and of vegetative reproduction—an example : degeneration of the Potato.]—*Nuovo G. bot. ital.*, N.S., 60, 3, pp. 771–784, 1953.

The author discusses, with numerous references to the literature, only some (28) of which are listed, the nature of plant virus diseases, particularly that of potato degeneration due to virus X, under the headings: the virus protein [cf. *R.A.M.*, 31, p. 518]; transmission and localization; movement of the virus within the plant [28, p. 28]; virus synthesis in the host cells [29, p. 494]; symptoms and growth modifications in plants affected by viroses [32, p. 420; 33, p. 45]; the interrelationships between virus synthesis and physiological processes [17, p. 706; 30, p. 624; 31, pp. 533, 571, *et passim*]; and the influence of viruses on vegetative reproduction [29, p. 578; 30, p. 579]. The author's view is that indoleacetic acid is liberated and is responsible for the resultant symptoms and abnormalities [33, p. 45].

Watson (D. J.). **Botany department.**—*Rep. Rothamst. exp. Sta., 1952*, pp. 65–73, 1953.

In work carried out in collaboration with the Plant Pathology Department, Rothamsted Experimental Station, by E. C. Humphries and B. Kassanis to determine the effect of darkness on the subsequent inoculation of leaves with viruses, they ascertained that in tobacco and French bean [*Phaseolus vulgaris*] plants [*R.A.M.*, 28, p. 208] the soluble nitrogen in the lamina increased during darkness, nitrate accounting for most of the increase. When the plants were returned to light, the nitrate content declined. The numbers of local lesions produced by [unspecified] virus on leaves of plants kept in light or darkness beforehand or inoculated at successive intervals after transference to the light, were generally closely correlated with the nitrate content of the leaves at the moment of inoculation. The evidence suggested that susceptibility to virus infection may depend on the concentration of simple soluble nitrogen compounds present in the leaf at the time of inoculation, and that the increased susceptibility induced by darkening the leaves beforehand may be due to an increased concentration of nitrogen compounds suitable for synthesis as virus.

P. C. Owen, working on the effect of infection with tobacco mosaic virus on the respiration of tobacco, found that there is wide variability in response to infection of comparable leaves between plants inoculated at the same time and between batches grown at different times and used at the same stage of development. The inoculations were made by rubbing the leaves with infective sap, some constituent of which acted as a spreader, so that less water was retained on the leaf surface after rubbing with sap than after rubbing with water (controls). This induced an apparent increase in the respiration rate of the former, if this rate was expressed on the basis of fresh weight after inoculation. In later experiments, therefore, the control leaves were rubbed with healthy sap.

D. J. Watson, in further work on the effect of sugar beet viruses on the respiration rate of the host [33, p. 130], found that infection by beet yellows virus [33, p. 460] greatly increased the rate in the leaf lamina. The increase was greatest soon after the first appearance of yellowing, being at this time more than twice that of comparable healthy laminae. The effect was progressively smaller in younger

leaves and diminished with age in the yellowed leaves. The respiration rate of the petioles was increased by infection, but less than that of the lamina.

With beet mosaic virus the respiration rate of infected laminae was never more than 25 per cent. greater than that of comparable healthy ones. Increases of up to 50 per cent. occurred in the petioles. With both yellows and mosaic the respiration rate of the roots of affected plants was unchanged.

PARHAM (B. E. V.). **Plant introduction and quarantine station, Fiji.**—*Agric. J. Fiji*, **24**, 1–2, pp. 18–29, 15 figs., 1953.

The Plant Introduction service of the Department of Agriculture of the Fiji Islands was inaugurated in 1936, when a plant introduction garden with a small insectary glasshouse was established at the Central Agricultural Station, Naduruloulou.

In 1949, following the transfer of the Station to Suva, it was decided to develop the Naduruloulou site for Plant Introduction, though the other stations and substations are used for the propagation of introduced material. Quarantine services, as provided by existing legislation in Fiji, have up to the present been limited to inspection of introduced plants, seeds, and cuttings at the main sea and air ports. Existing facilities for fumigation, disinfection, and disposal of dangerous material at Suva and Lautoka have proved inadequate to deal with increased traffic, and the services are to be expanded by the improvement of fumigation chambers, the erection of a second insectary, the provision of isolation plots for plant introductions, and close co-operation between plant inspectors, the plant pathologist, the entomologist, and the agricultural staff. A more detailed report is in preparation.

Distribution Maps of Plant Diseases.—Maps 265–282. Issued by the Commonwealth Mycological Institute, 1953. 6*s.* 0*d.*

The twelfth year's issue of this series of maps showing the world distribution of major crop diseases [cf. *R.A.M.*, **32**, p. 288] comprises (No. 265) *Uromyces betae* on beet, (266) *Diplocarpon rosae* on *Rosa* spp., (267) *Helminthosporium victoriae* on oats, etc., (268) *Peronospora manshurica* on soy-bean, (269) *Xanthomonas vesicatoria* on tomato, chilli, etc., (270) *Helminthosporium heveae* on *Hevea* rubber, (271) *Fomes annosus* on conifers and deciduous trees, (272) *Cryptostroma corticale* on sycamore (*Acer pseudoplatanus*) and other *A.* spp., (273) *Ascochyta pisi* on peas, broad beans, lucerne, etc., (274) *Sclerotinia trifoliorum* on clover, lucerne, etc., (275) *Helicobasidium purpureum* on potato and other hosts, (276) *Haplographium calophylli* on *Calophyllum* spp., (277) *Phytophthora capsici* on chilli, cucumber, tomato, etc., (278) *Mycosphaerella aleuritidis* on tung, (279) *Puccinia sorghi* on maize, (280) *Phytophthora cactorum* on various hosts, (281) *P. drechsleri* on various hosts, and (282) *Periconia circinata* on sorghum.

HACK (JUDITH), WILLIAMS (P. H.), EBBEN (M[ARION] H.), HOWLES (R.), READ (W. H.), SMITH (R. J.), HUGHES (J. T.), DAVIES (J. N.), & MESSING (J. H. L.). **Plant diseases. Insecticides and fungicides. Chemical investigations.**—*Rep. exp. Res. Sta. Cheshunt, 1952*, pp. 21–34, 49–53, 63–74, 7 graphs, 1953.

In this report [cf. *R.A.M.*, **32**, p. 607] JUDITH HACK and P. H. WILLIAMS state that further studies on tomato stem rot (*Didymella lycopersici*) [33, p. 266] showed that different strains of the fungus vary considerably in their ability to increase in soil under identical conditions, and that strain differences are fully revealed only when tests are made with several soils. When spores of four strains were added to moist, sterilized soil of two types, the great majority of them germinated and the mycelium spread throughout the soil without any differences in vegetative growth due to soil or strain. When known numbers of spores of four strains were added to

moist, sterilized maiden loam in flasks, there were marked increases in numbers of all strains on plating after one month's incubation, though there was a 50-fold difference between extremes. When soil from the Station's glasshouses was used, two strains increased considerably, though less than on maiden loam, but the other two did not increase. Strains that spored freely on Czapek-Dox agar also did so on the loam but not necessarily on nursery soils.

In an experiment in which Potentate tomato plants were grown in soil samples inoculated with spores of *D. lycopersici* at regular intervals after steaming it was found that the fungus had increased greatly in the soil inoculated immediately or soon after steaming but to a less extent where inoculation was later, severity of infection diminishing progressively as the period between steaming and inoculation increased.

Thirty per cent. of the organisms isolated from Station glasshouse soil and 28 per cent. of those from a commercial nursery soil proved able to arrest the growth of two strains of *D. lycopersici*.

It was ascertained that, following the application of a spore suspension to petiole stubs immediately after the removal of a leaf, the fungus had penetrated 1 to 1·5 mm. in 48 to 120 hours and 1 cm. in seven days. The period that elapsed before inoculation of petiole stubs after leaves were cut or broken off was not significant to infection, but more wounds became invaded where the third and fifth leaves were removed than when the seventh leaf was taken, and where the leaves had been snapped off instead of being cut.

In further work on tomato root rot Marion H. Ebben and P. H. Williams found that *Penicillium* spp. were common in soil samples and in the surface and tissue of root debris taken from two plots during the first two months of 1952 following cropping in 1951; one plot had been steamed in 1950 and the other in 1949. *Mucor* spp. were less frequent on the root surface and tissue than in the soil; *Fusarium* spp. were isolated from all three sources. Fungus K and *Myrothecium roridum* were obtained more frequently from soil than from dead roots. *Colletotrichum atramentarium* was isolated occasionally, but only from dead roots in unsteamed soil.

Sterilized soil in pots was planted with young tomato plants; old tomato roots artificially infected with some of the fungi found in these investigations were added. After five months *C. atramentarium* had established itself on the root surface and in the root, but seldom in the soil. *Chaetomium cochlioides* became established in the soil, on the root surface, and in root tissue, and was also isolated from the stem. *M. roridum* was common in the soil and established itself on the root surface. Fungus K established itself in the soil and to a small extent on the root surface, but was seldom isolated from root tissue.

Inoculations by P. H. Williams with *Mycosphaerella citrullina* [cf. 25, p. 23; 33, p. 266] isolated from cucumber shoots at the Station showed that cucumber and melon stems and marrow petioles (but not the stems) could be attacked; the fungus fruited on the diseased tissue. Tomato stems were not invaded, but the fungus caused slight rotting of tomato fruits.

R. Howles states that in further experiments on the treatment of tomato seed infected with tobacco mosaic virus exposure for 22 days at 142·5° F. reduced the virus content to about 7 per cent. of that of the untreated. In treatments of arum lily corms [*Zantedeschia* sp.] infected with [tomato] spotted wilt virus [26, p. 372; cf. 30, p. 570] by hot water (109° and 93°), moist air at 107·5°, and normal air at 107·5°, the best result (reduction of infection to 25 per cent.) was given by normal air treatment for 58·5 hours.

Of numerous chemicals applied to the roots or sprayed on the leaves of chrysanthemum plants for the control of chrysanthemum mosaic virus [32, p. 610], only 2,4-D gave promising results. The virus was transmitted to 10 of 15 potted

plants heat-treated for one day at 105° in March in a moist atmosphere and immediately afterwards dusted with carborundum powder and treated with chrysanthemum mosaic virus solution; the virus was also transmitted to 5 of 15 plants similarly treated at 113° in July and August.

In screening trials by W. H. Read, R. J. Smith, and J. T. Hughes with various fungicides for the control of cucumber mildew (*Erysiphe cichoracearum*) [32, p. 609] karathane W.P.25 [32, p. 169] at 0·025 per cent. w/v, equivalent to 0·006 per cent. active material, gave better control than the standard copper-petroleum mixture (0·06 per cent. copper as copper oxychloride in 0·35 per cent. petroleum). The product is, however, of doubtful safety on cucumbers. Promising results were also given by phygon. Applications of dithane Z-78 (1 lb. in 60 gals., equivalent to 0·11 per cent. w/v zineb) and copper-petroleum appeared to give equivalent control five days after the first spraying, but the re-development of mildew from diseased areas and new infections were more extensive on the dithane-treated plants than on the copper-sprayed. In addition, the deposit from dithane Z-78 was so conspicuous after a single application that its removal from cucumbers before marketing would be essential. The same conclusions were reached with melons.

The most promising compound tested against tomato leaf mould (*Cladosporium fulvum*) [31, pp. 291, 521, 593], 4-amino-2-chlorophenol, gave, as a 0·25 per cent. spray, as good control as copper-petroleum spray. Of fungicidal pastes applied to tomato stems against *D. lycopersici*, certain organo-mercurial compounds showed promise in arresting the development of lesions when tested on plants about 2 ft. high.

J. N. Davies points out that care should be taken to ensure that steamed soil is properly protected against infestation during storage and not allowed to come into contact with unsteamed soil or unsterilized seed-boxes or pots.

Details are given of the results of further nutrient deficiency experiments with Maytime and Spectrum perpetual-flowering carnations carried out by J. H. L. Messing. In the absence of nitrogen, growth was slow and extremely hard, the internodes failing to elongate. Varieties with long, soft leaves showed more conspicuously than other varieties the 'curly tip' symptom, in which the tips of the young leaves failed to separate and the continuing growth produced a characteristic curvature. There appeared to be no characteristic visual symptoms by which phosphorus deficiency could readily be identified. No visual symptoms of manganese, iron, or zinc deficiency were apparent, and it is concluded that the requirements of carnations for these elements, especially manganese, are probably very low.

Report of the Waite Agricultural Research Institute, South Australia, 1950–1951.—62 pp., 1 col. pl., 1 map, 1953. [Received 1954.]

In the plant pathology section (pp. 24–27) of this report [cf. *R.A.M.*, 30, p. 19], which incorporates the associated activities of the Commonwealth Scientific and Industrial Research Organization, it is stated that a survey is being made of the damping-off of seedlings associated with *Corticium praticola* [33, p. 208]. New records for South Australia are *C. praticola* on tomato and vegetable seedlings and *Urocystis cepulae* on onion.

Work on *Ophiobolus graminis* on wheat [32, p. 237] has shown that longer fallowing reduces the incidence of the disease. In a study of variation and host specialization in *Rhizoctonia* [*C.*] *solani* [cf. 33, p. 366], two types of specialization have been demonstrated on a wide range of hosts, acting at (*a*) the pre-penetration stage, when chemical stimulation of the hyphae on the external surface of the host causes them to form infection plates, and (*b*) the post-penetration stage, when the penetrating hyphae are killed by host reaction.

Pythium spp. are able to survive for at least two years in soil of 1·5 per cent.

moisture content at 25° C. but not at 40°. Build-up in the field is so rapid, however, that summer conditions do not exert appreciable control.

The discharge of ascospores from fallen apple leaves infected with *Venturia inaequalis* [33, p. 359] extended into December and, together with bud scale infections, was responsible for the initiation of spring infections. Field evidence gathered during a survey suggested that the decline of Williams Favourite and other cherry varieties in the Adelaide Hills was due to a virus disease.

NEVELING (C. H.). **Annual Report of the Secretary for Agriculture for the year ended 31 August 1953.**—*Fmg in S. Afr.*, 29, 334, 124 pp., 2 figs., 1954.

In the Botany section of this report from South Africa [cf. *R.A.M.*, 32, p. 365] R. A. DYER reports (pp. 37, 81) that the most important fungi identified for the Forestry Department were *Diplodia pinea* on pines in Swaziland and Eastern Transvaal and *Armillaria mellea* on *Pinus caribaea*. *Helminthosporium ravenelii* caused stock poisoning in eastern Cape Province. In the section on Plant Pathology by J. E. VAN DER PLANK (pp. 50, 75) it is stated that once healthy, self-rooted or grafted citrus seedlings are exposed in the field they soon contract [unspecified] virus infection following infestation by *Aphis citricidus* [33, p. 293], but, nevertheless, most species grown on their own roots or on rough lemon continue to maintain vigorous growth and exhibit a high degree of tolerance in their early years. Such seedlings appear to offer a possible solution to the problem of virus decline in old, clonal grapefruit lines.

Maize head smut (*Sphacelotheca reiliana*) [32, p. 366] and *Diplodia* ear rot [*D.* ? *zeae*: 23, p. 10] were unusually prevalent. Downy mildew [*Sclerospora* sp.: cf. 32, p. 427] was recorded on maize from Warmbaths and Barberton. Two-thirds of the farmers consulted reported favourably on the resistance to maize streak virus of seed of the hybrid Potchefstroom Pearl × (Peruvian × Hickory King). Except for inbred lines with very long internodes, resistance to stalk rot (*Fusarium moniliforme* [*Gibberella fujikuroi*] var. *subglutinans*) was transferred from these to single crosses.

The most common diseases of kaffir corn [*Sorghum caffrorum*] were the smuts *Sphacelotheca sorghi* [C.M.I. map No. 220], *S. cruenta*, and *S. reiliana*. Trigosan, trigosan C, mergamma B, fernasan, arasan, leytosan, and ceresan were effective in disinfection trials on seed artificially infected with *S. sorghi* [cf. *R.A.M.*, 25, p. 12]. Bacterial streak (*Xanthomonas holcicola*) [31, p. 536] was fairly common; occasional reports were received of downy mildew (*Sclerospora sorghi*) [C.M.I. map No. 179].

Of about 60 wheat varieties tested in the seedling stage for resistance to *Puccinia graminis* f. 34, the common form in the Transvaal [*R.A.M.*, 29, p. 290], Improved Kenya and Penkop were highly resistant and Goudveld and Rooi Spitskop fairly so. Only Klipkous and Wolkoring were resistant to f. 34 at Potchefstroom. It appears to differ from the forms in Canada, New Zealand, and Germany.

New potato lines with a measure of resistance to leaf roll and promising agronomic features have been bred from Shamrock, South Esk, and various unnamed varieties from Basutoland and South America. Nearly half have field immunity from potato virus X and many may also be resistant to virus A. Several lines with varying numbers of genes of resistance to *Phytophthora infestans* are under trial. Strain (1,2) of the fungus [33, p. 250] was found during the year.

Field studies on rosette [29, p. 10] and mosaic [cf. 29, p. 397] viruses of groundnuts indicate that spread from infected volunteer and old plants by aphids is small [cf. 33, p. 575]. Infection may be avoided by sowing from early in September to the end of November. December and January planting resulted in almost 100 per cent. infection. Three further viruses, temporarily named green rosette, vein-banding, and fleck, are transmitted by *Aphis craccivora*.

Colletotrichum papayae [cf. 33, p. 164] severely damaged green papaw fruits in Natal, causing numerous spots which rapidly coalesced to rot the fruit. Monthly Bordeaux sprays were successful in preliminary trials.

S. J. Du Plessis, in a section on plant control and quarantine (p. 51), reports that the number of farms affected by vine bacterial blight [*Erwinia vitivora*] has increased from 264 to 338 mainly as a result of its considerable spread in the Paarl and the Breë River localities, Worcester district, due probably to moist north-westerly winds having carried the bacteria to new areas where favourable spring weather had predisposed new vines to infection.

Strict supervision of 18 commercial gardens in the Witwatersrand and the municipal areas of Volksrust, Wakkerstroom, Ermelo, Carolina, Hendrina, Belfast, Charlestown, and Harrismith infected with potato wart disease [*Synchytrium endobioticum*: C.M.I. map No. 1] prevented any new outbreaks.

R. I. Nel (pp. 83–86, 103–104), dealing with deciduous fruit research, states that a comprehensive investigation showed that many cases of silver leaf are of a physiological nature, but that true silver leaf (*Stereum purpureum*) [No. 30] occurs quite generally in Western Province orchards. As fruiting bodies were found under natural conditions in a few places it is concluded that the disease may spread by means of spores in South Africa. There are important infection sources in Western Province on prunings from infected trees left lying on the ground; there are also affected forest and ornamental trees in the vicinity.

Infection of vines by *E. vitivora* appears to be correlated with factors governing stomatal activity. So far there are sufficient differences in susceptibility to constitute a basis for breeding resistant commercial varieties. Spring sprays of Bordeaux mixture and captan reduced bunch infection markedly. Captan was also extremely effective against pear scab (*Venturia pirina*) [*R.A.M.*, 33, p. 92].

R. H. Marloth, reporting on citrus and subtropical fruit research (pp. 87–90, 104), states that immersion of citrus fruits for three minutes in a tank containing 0·15 per cent. dowicide 'A' [33, p. 72] plus 200 p.p.m. 2,4-D [31, p. 603] at 120° F. resulted in marked control of wastage by *Diplodia* stem end rot [*D. natalensis*] and blue and green mould [*Penicillium italicum* and *P. digitatum*] as compared with dowicide alone. Lemon black spot [*Guignardia citricarpa*: 32, p. 373] has increased considerably in the lowveld during the past two years. Trees receiving nitrogen and kraal manure were more severely affected than less vigorous and productive ones given no fertilizer. Monthly spraying from blossoming with 2–1–80 Bordeaux mixture gave 92 per cent. clean fruit as against 56 per cent. on the unsprayed controls.

D. F. Retief, in charge of tobacco research (pp. 91–93), states that iscothan (1:1,000) controlled 95 per cent. of the mildew (*Oidium tabaci*) [*Erysiphe cichoracearum*: cf. 32, pp. 558, 666]. This fungicide is not yet available in large quantities in South Africa.

Orian (G.). **Botanical Division.**—*Rep. Dep. Agric. Mauritius, 1952*, pp. 37–40, 1953.

It is stated in this report [cf. *R.A.M.*, 32, p. 613] that most of the sugar-cane varieties grown in Mauritius, I/37 in particular, are susceptible to chlorotic streak [loc. cit.], which is very serious in areas with heavy, wet, badly drained soil.

Tobacco damping-off [33, p. 120] caused some damage in planters' seed beds after rainy periods, but losses were smaller in demonstration beds treated with Cheshunt compound. Black shank [*Phytophthora parasitica* var. *nicotianae*: 22, p. 11] was severe in early but less so in later plantations at the Richelieu Tobacco Station. Tobacco leaf curl [virus: 31, p. 537] was recorded once at the Central Station, Réduit, five times in the Rivière du Rempart district, and once at Triolet, indicating that the virus is not readily transmitted from wild hosts.

In the potato varietal trial for resistance to leaf roll virus [31, p. 538] some of the best certified 'A' varieties from the South African Potato Board were tested at the Central Experimental Station and at the Royal Botanical Gardens, Pamplemousses. King George (from Ceres, Cape Province) was completely free from the disease, while Up-to-Date (from Amsterdam and Leslie, Transvaal, and Donnybrook, Natal), Majestic (Donnybrook), and Kennebec (Amsterdam) showed varying percentages of infection.

Corticium salmonicolor caused die-back of branches of filao (*Casuarina tenuissima*) [2, p. 203] at the Curepipe Forest Nursery.

Pseudomonas solanacearum was found to be responsible for wilt disease of ginger plants at Crève-Cœur in the Montagne Longue region. The bacterium produced the characteristic wilt symptoms in tomato plants. The white leaf spotting again observed on ginger is considered to be the worst ginger disease in the region; the plants dry when spotting is severe.

Attacks of eucalyptus leaf spot (*Calonectria theae*) were severe during the wet months (April and May), while die-back of stem and branches, due to *Corticium salmonicolor* [cf. 24, p. 206], was observed only in a few isolated places on the central plateau.

Among the other diseases noticed were peach canker associated with *Nectria haematococca* ? var. *cancri*, onion damping-off (*Colletotrichum circinans*) [cf. 31, p. 256], root and collar rot (*Aspergillus niger*) [cf. 33, p. 519] and stem rot (*Botryodiplodia theobromae*) [cf. 27, p. 171] of groundnut, stem rot of *Voandzia subterranea* caused by *Sclerotium rolfsii*, and top rot of *Yucca* ? *gloriosa* caused by *Phytophthora palmivora*.

Deighton (F. C.). **Plant pathology section.**—*Rep. Dep. Agric. S. Leone, 1951*, pp. 21–23, 1953.

It is stated in this report [cf. *R.A.M.*, 32, p. 366] that *Isariopsis griseola*, not seen since 1949 [31, p. 476], was abundant at New England, Freetown, on the Black Sinebone bean (*Phaseolus vulgaris*) recently introduced from British Guiana. Severe outbreaks of citrus scab (*Elsinoe fawcetti*) [32, p. 366] at the Newton Agricultural Station were suppressed successfully by the control measures previously recommended [loc. cit.].

Of the 100 collections of groundnuts examined 80 per cent. were infected with *Cercospora arachidicola* [loc. cit.], 10 with *C. personata* [loc. cit.], and 10 with both. There has been no record of defoliation (*C. personata*) at Njala since 1937, with the exception of one case in 1946. The local Kono groundnut variety, now commonly grown in Sierra Leone, though highly susceptible to *C. arachidicola* escapes infection by *C. personata* because of its rapid maturation.

A large sclerotial strain of the *Rhizoctonia* [*Corticium*] *solani* group was responsible for withering and white blotches on the leaves of *Panicum maximum* var. *pubiglume* C.P.I. 8387 and *P. m.* var. C.P.I. 8389 in fodder plots at Njala in the wet season. The same strain of the fungus was isolated from similar white blotches on leaves of *Axonopus compressus* and *Cynodon dactylon* on lawns at Njala, while *Schizachyrium brevifolium* and *A. africanus* bore similar blotches.

A species of *Sphacelia* was common in the ovaries of all varieties of *P. maximum* at Njala and in the dry season was usually overgrown by *Cerebella andropogonis* [cf. 27, p. 100].

Maize rust (*Puccinia polysora*) [33, pp. 281, 420], though common in most parts of Sierra Leone, caused negligible damage. A light attack of *P. sorghi* [C.M.I. map No. 279] was reported in early December in native maize plots.

Ephelis pallida was again observed on rice [*R.A.M.*, 31, p. 476] at the Rokupr Agricultural Experiment Station, attacking the varieties D.99, Ngasein 57, Toma 112, Indo-China 70, and Kavunginpoothala 12; it was also detected on *Panicum*

laxum, two forms of *Paspalum commersonii*, and *Acroceras zizanoides* (a new wild host record).

Cercospora leaf spot [*C. puderii*: 17, p. 753] was very common on older rose leaves at Njala, Makeri, Rokupr, and Newton. *Diplocarpon rosae* [C.M.I. map No. 266] was common in Freetown and Waterloo.

Included among the new records were *Leveillula taurica* [No. 217] on *Solanum incanum* and *S. macrocarpum* at Njala; *Puccinia purpurea* on *Sorghum almum* imported as seed from Argentina [No. 212]; and *Hemileia buntingii* on *Strophanthus sarmentosus*.

VESTAL (E. F.). **Some plant disease problems of Jordan.**—*Plant Dis. Reptr*, 38, 3, pp. 226–237, 8 figs., 1954. [Multilithed.]

This report on plant disease occurrences in Jordan includes observations made during 1952 and 1953 and a review of the available literature (91 titles). Much of the information given has already been recorded in publications from the area formerly known as Palestine [cf. *R.A.M.*, 33, p. 564]. Among the diseases observed were downy mildew (*Plasmopara viticola*) on vine [C.M.I. map No. 221] and fire-blight (*Erwinia amylovora*) on apple [No. 2].

Late reports on newer varieties.—*Seed World*, 74, 11, p. 66, 1954.

The new potato variety Delus, medium- to late-maturing and immune from the common races of late blight [*Phytophthora infestans*: *R.A.M.*, 33, p. 592], was developed in Delaware and is becoming an important variety in the area.

Onas 53, a new wheat variety resistant to stem rust [*Puccinia graminis*: see below, p. 663], is recommended by the California [Agricultural Experiment] Station for all irrigated lands where early maturity is not essential and average losses from shattering are low and for dry-land farms suitable for varieties slightly later than Baart [cf. 33, p. 472].

Research work and workers.—*Seed World*, 74, 11, pp. 84, 86, 1954.

Groundnut strains, selected from the descendants of seeds exposed to atomic radiation at Oak Ridge in 1949, are reported from the North Carolina State College to be resistant to leaf spot [*Cercospora personata* and *C. arachidicola*: *R.A.M.*, 33, p. 463].

At the Brookhaven National Laboratory, Mohawk oats, grown from seeds exposed to radiation, proved resistant to race 7A of stem rust [*Puccinia graminis*: cf. 33, p. 597].

PRICE (W. C.) & GAINOR (C.). **Relationship of foliage to stimulation of adventitious roots in crown gall.**—*Phytopathology*, 44, 2, pp. 107–109, 1 fig., 1954.

The results of experiments at the University of Pennsylvania, Pittsburgh, involving the repeated inoculation over a two-year period of *Kalanchoe daigremontiana* plants in various states of artificial defoliation with culture $B6_1$ of *Agrobacterium* [*Bacterium*] *tumefaciens* [*R.A.M.*, 33, p. 339] suggested, but did not prove, that a substance (apparently not indole-3-acetic acid) inciting the stimulation of adventitious roots is organized in the leaves and transported to the site of gall tissue. Plants with the largest number of leaves above the galls usually produced the most copious growth of adventitious roots, while conversely, the removal of all the leaves but the pair at the extreme tip reduced new root development to a minimum.

EBERTS (F. S.), BURRIS (R. H.), & RIKER (A. J.). **The metabolism of nitrogenous compounds by sunflower crown gall tissue cultures.**—*Plant Physiol.*, 29, 1, pp. 1–10, 1 graph, 1954.

In a study of the nitrogen metabolism of excised crown gall (*Agrobacterium*

[*Bacterium*] *tumefaciens*) tissue from sunflower [*R.A.M.*, 33, p. 144] at the University of Wisconsin, no correlation was found between the activity of certain transaminases in crude tissue homogenates and the growth of the tissue when supplied with various levels of glutamate, aspartate, or alanine. With nitrate as well as amino acids in the medium the tissue utilized both sources of nitrogen. The distribution of labelled nitrogen N^{15}, added to the medium as DL-alanine or DL-glutamic acid, varied in a subsequent tissue hydrolysate according to the amino acid added and its concentration. Glutamic acid was the most highly utilized amino acid, followed by alanine, aspartic acid, threonine, serine, methionine, and phenylalanine.

A Report on Cacao Research 1952.—Imperial College of Tropical Agriculture, St. Augustine, Trinidad, 71 pp., 6 figs., 7 graphs, 1953. [Received January, 1954.]

In the botanical section of this report of the work of the Imperial College of Tropical Agriculture, Trinidad [cf. *R.A.M.*, 33, p. 214], R. E. D. Baker (pp. 8–10), describing the Anglo-Colombian Cacao-Collecting Expedition in 1952, states that the wild specimens of cacao collected in Colombia are of the Amelonado type, are susceptible to witches' broom (*Marasmius perniciosus*), and have no genetic or commercial possibilities. *M. perniciosus* was found on cacao and on the wild species *Theobroma subincana*, *T. microcarpa*, and *T. obovata* on the Rio Caqueta, and on *T. subincana* on the Rio Apaporis and Rio Vaupés. The disease was not found on these hosts on the Rio Negro, the Rio Guainia, the Rio Guaviare, or in the Cauca Valley. It is possible that this disease, which is presumed to be indigenous in the Amazon basin, has not yet penetrated the Colombian valleys of the Cordilleras.

H. Evans and D. B. Murray (pp. 27–31) describe in detail the application of rapid chemical tissue tests to the determination of mineral levels in cacao [32, pp. 13, 548]. Normal levels of phosphate in healthy cacao lie between 20 and 40 p.p.m.; for potassium between 150 and 400, depending on the light intensity; for magnesium 30 to 50; for calcium 5 to 15; for manganese 0·4 to 1; and for chloride 1 to 5. The treatment of iron chlorosis [loc. cit.] with iron ethylene diamine tetra-acetic acid (Fe-EDTA) [33, p. 426] is described by D. B. Murray (pp. 32–33). Chlorotic cacao seedlings growing in soil in baskets were treated with ferrous sulphate, Fe-EDTA, and calcium carbonate in varying combinations and concentrations. Complete cure of the chlorotic condition was obtained with 5 gm. ferrosene (solid Fe-EDTA containing 8 per cent. iron) after six weeks. In the field chlorotic cacao trees have been improved by Fe-EDTA spread on the soil and left to be washed in by rain. Further experiments are necessary to determine the persistence of this treatment and its possible effect on the tree.

The collection of leaf samples of cacao for the assessment of the nutrient status of the tree is discussed by R. G. Fennah (pp. 36–40). A sampling method is described which is designed to give information on the differences due to nutrient status, the age of the tissue, and rate of change due to growth and other factors.

G. Rodriguez (pp. 47–48) investigates further the occurrence of marginal leaf scorch in cacao leaves which has been ascribed to soil potassium deficiency [16, p. 592]. Scorched leaves show a remarkable accumulation of chlorine, but at present there is not sufficient evidence to indicate whether or not sea-blast is responsible. The changes in the scorched leaf are equivalent to premature ageing, with a loss of potassium and a gain in calcium and chlorine.

In the progress report on plant pathology W. T. Dale (pp. 60–61) states that in the analysis of yields of various ICS clones there is a significant positive correlation between pod, cushion, and vegetative susceptibility to *M. perniciosus* [32, p. 305]. Segregation for resistance occurred in the F_1 of ICS1 × two resistant Amazonian clones (SCA 6 and 12) [33, p. 593], and selections are being made.

Following the removal of old heavily-infected trees and cutting out 'brooms' twice yearly, pod losses due to the disease have been reduced to less than 10 per cent. in fields of young cacao at River Estate. Spraying with Bordeaux mixture for the control of *M. perniciosus* [33, p. 219] might be economic in high-yielding fields, using a low-volume mist blower, and spraying only in the August–November period when the pods are at their most susceptible and weather conditions are favourable for the spread of the disease. An experimental monthly spraying with 1 or 2 per cent. Bordeaux mixture gave a significant reduction in the number of infected pods, but is not worth while unless losses exceed 10 per cent. On the Non Pareil Estate 26 per cent. of the harvested pods over 10 cm. long were infected by *Phytophthora palmivora* [33, p. 593] as against 10 per cent. by *M. perniciosus*.

Enfermedades del Cacao. La escoba de bruja. [Cacao diseases. Witches' broom.]—*Agricultor venezol.*, 19, 167, pp. 16–19, 6 figs., 1954.

This is a brief, popular account of the symptoms, control by means of complete or partial eradication methods, and importance of certain cultural practices in the reduction of witches' broom [*Marasmius perniciosus*] of cacao in Venezuela [*R.A.M.*, 29, p. 147; 33, p. 593 and preceding abstract].

Thorold (C. A.). **Use of ultra-violet fluorescent substances for observations on dispersal of Phytophthora palmivora sporangia.**—*Nature, Lond.*, 174, 4426, p. 409, 1954.

In view of the need for a method of distinguishing the sporangia of *Phytophthora palmivora* dispersed from a particular cacao pod [*R.A.M.*, 32, p. 12], means of marking them with a substance fluorescing in ultra-violet light were studied at the Department of Agriculture, Ibadan, Nigeria. The sporangia were stained readily and fluoresced very conspicuously with no apparent toxic effect when sprayed *in situ* with a saturated solution of primuline *A*.150. Fluorescent sporangia were observed on vaselined cellophane disks (3 mm. in diameter) exposed during rainless periods, when take-off apparently occurred in 'dry' air, the number per disk averaging 0·3 per 12-hour period. An average of 1·4 per disk per 12-hour period appeared during rainfall, indicating that rain-splash take-off had occurred.

Shu (P.), Tanner (Kathleen G.), & Ledingham (G. A.). **Studies on the respiration of resting and germinating uredospores of Wheat stem rust.**—*Canad. J. Bot.*, 32, 1, pp. 16–23, 1954.

A better understanding of the parasitic nature of rusts requires further knowledge of their physiology, particularly nutritional requirements. To date, the essential nutrients obtained from their hosts and details of their metabolic systems are not known [cf. *R.A.M.*, 31, p. 72]. Since the spores develop germ-tubes readily, the substrate utilized during germination must be endogenous and the spores, after hydration, must contain a complete enzyme system for its degradation. Therefore, it seemed reasonable to assume that a better knowledge of the metabolic patterns of the spores and their germ-tubes might elucidate the nutritional requirements of these fungi. The present study at the Prairie Regional Laboratory, Saskatoon, was undertaken to determine the specific endogenous substrate and, by means of commercially available intermediary metabolic compounds and enzyme inhibitors, to obtain some indications of the metabolism of germinating uredospores of *Puccinia graminis*.

The lipid fraction was the major endogenous substrate utilized, together with some nitrogenous material, presumably protein; an increase in chitin occurred. Cyanide and azide strongly retarded spore respiration, and this, together with the findings that the spore material contained haematin and reacted positively to the

Nadi reagent, suggested that a cytochrome system was operative in the respiration process. Of various metabolic intermediary compounds known to inhibit succinic dehydrogenase, only pyrophosphate appreciably retarded carbon dioxide production. Respiration was also inhibited by iodoacetate, benzoate, and arsenate.

Ausemus (E. R.). **Breeding Wheat by international co-operation.**—*Seed World*, 75, 1, pp. 40–41, 1954.

Two new spring bread wheats resistant to race 15B of wheat stem rust [*Puccinia graminis*] have been developed, Selkirk in Canada [*R.A.M.*, 33, pp. 416, 589] and Willet in the United States. The former is being distributed to growers in Canada, North and South Dakota, and Minnesota, while the latter is being grown under contract and will be available for distribution only after 1955.

Frisco, new soft red winter Wheat.—*Seed World*, 74, 11, p. 66, 1954.

Frisco wheat, resistant to the current races of leaf rust [*Puccinia triticina*: *R.A.M.*, 33, p. 472 and following abstracts] and to some races of stem rust [*P. graminis*: see preceding abstract], though not 15B, was developed by the Texas [Agricultural Experiment] Station from the cross (Fronteira × Red May) × Red May. The variety is expected to be available to growers after the 1954 harvest, but, because of the widespread occurrence of race 15B, it is recommended only for certain counties.

Da Silva (A. R.). **El concepto de raza fisiológica en el mejoramiento del Trigo relativo a la resistencia a las royas de la hoja y tallo (Puccinia rubigo-vera tritici y P. graminis tritici).** [The physiological race concept in Wheat improvement in relation to resistance to leaf and stem rust (*Puccinia rubigo-vera tritici* and *P. graminis tritici*).]—*Arch. fitotéc. Urug.*, 5, 1, pp. 131–136, 1952. [English summary, p. 176.]

The author describes, with the aid of the literature, current trends in breeding for resistance to wheat stem and leaf rust (*Puccinia graminis* and *P. rubigo-vera tritici* [*P. triticina*]) in relation to their physiologic races [*R.A.M.*, 32, p. 672 and preceding and following abstracts] and suggests certain lines for future research, notably a study of mature plant reaction rather than that of the seedling, and the conduction of breeding programmes on a regional basis.

Boasso (Celia S.) & Levine (M. N.). **Roya de la hoja del Trigo, Puccinia rubigo-vera tritici en el Uruguay.** [Leaf rust of Wheat, *Puccinia rubigo-vera tritici*, in Uruguay.]—*Arch. fitotéc. Urug.*, 5, 1, pp. 21–31, 6 figs., 1952. [English summary, pp. 171–172.]

This information concerning *Puccinia rubigo-vera tritici* [*P. triticina*] on wheat in Uruguay has already been noticed from another source [*R.A.M.*, 31, p. 10].

Martinez (L. M.), Ausemus (E. R.), & Burnham (C. R.). **Inheritance of reaction to leaf rust, Puccinia rubigo-vera tritici (Erikss.) Carleton, and of certain other characters in a Wheat cross.**—*Tech. Bull. Minn. agric. Exp. Sta.* 205, 35 pp., 1953.

In this account of studies conducted at the University of Minnesota to determine the mode of inheritance of reaction to wheat leaf rust (*Puccinia rubigo-vera tritici*) [*P. triticina*: see preceding abstracts] in the cross Thatcher × (Premier × Bobin-Gaza-Bobin) Nursery Stock No. II–39–2, an abstract of which has already been noticed [*R.A.M.*, 32, p. 244], it is stated that if the genes, one for each rust race, responsible for seedling reaction to races 1, 2, 5, 15, 28, and 128a, are designated by the race number the gene order on the chromosome is 1, 128a, 15, 2, 28, 5; the

recombination values or map distances are given. Although the data agreed with the linkage hypothesis, more genetical and cytological data are required to prove its correctness.

Dorohova (Mme N. A.). К вопросу о микотрофном питании Пшеницы. [On the question of mycotrophic nutrition of Wheat.]—Агробиология [*Agrobiology, Moscow*], *1953*, 5, pp. 51–62, 7 figs., 2 graphs, 1953.

Investigations were carried out conjointly by the Williams Soil-Agronomical Institute and the Moscow State Pedological Institute, U.S.S.R., on the micro-organisms influencing the growth and development of wheat. In 1946 washed, surface sterilized, dark wheat roots (varieties Gordeiforme 10, Caerulescens 1577, and Mildurum) yielded bacteria in 31 to 72 per cent. of the tests, and 21 to 50 per cent. gave *Fusarium* spp.; *Alternaria* sp. was encountered rarely. In 1947, using the varieties Gordeiforme 10, Gordeiforme 189, and Melyanopus 69, the figures were 55 to 100 per cent. bacteria and 10 to 42 per cent. *Fusarium* spp.

In 1948 soft wheat roots sterilized with NIUIF-1 (10-minute dip in a 1 in 400 solution) were placed on agarized must wash. Micro-organisms counted on the fifth day included bacteria and *Fusarium*, and on the tenth day *Trichoderma* and *Alternaria*.

In 1949 all the young, dark, lateral roots treated with NIUIF-1 (3 minutes in 1 in 100) yielded bacteria on agarized oat or wheat decoction acidified to pH 5·8 to 6·2. Roots of soft and hard wheat yielded *Fusarium* spp., and the hard in addition contained a *Trichoderma* parasitizing *Fusarium*, actinomycetes, and sterile mycelia.

Strains 77 and 78 of *Fusarium* had no effect on the growth and development of Gordeiforme 189 at soil moisture percentages of 80, 60, and 50, but at 45 per cent. growth was increased, strain 77 in particular raising the fresh green weight by 26 per cent. and the dry weight by 48 per cent. In another experiment all the micro-organisms tested, *Fusarium* spp. in particular, increased the green weight by 49 to 148 per cent. at 45 per cent. soil humidity and also at 60 per cent., except in the case of actinomycete 5, which in combination with *Fusarium* 53, alone and with *Bacterium* 51, reduced the green weight by 34 and 7 per cent., respectively, and *Trichoderma* 85, which alone reduced it by 9 per cent. and with *Fusarium* 53 by 4 per cent. The *Fusarium* spp. were harmful to the plant at 80 per cent. soil humidity.

Hårdh (J. E.). **Kevätvehnän kahutähkäisyydestä sekä sen syistä Suomessa.** [Shrivelheads of spring Wheat and their causes in Finland.] — *Valt. Maatalousk. Julk.* 140, 152 pp., 29 figs., 5 graphs, 2 maps, 1953. [English summary.]

This monograph brings together all the information on shrivelheads of spring wheat in Finland compiled since 1936, when the first records were made. The destructiveness of the disease has been very serious at times. It is most serious in the west, especially in the Pohjanma and Satakunta areas, where 30 to 80 per cent. of the ears may be destroyed. The ears contain fewer kernels, which are small and prematurely dried, but they are not bleached as in whiteheads.

Of the numerous fungi isolated between 1949 and 1953, *Cladosporium herbarum* was very common on the shrivelled grains and *Cercosporella herpotrichoides* [C.M.I. map No. 74] the one most frequently isolated from straw. The latter proved to be the most important in inducing foot rot [*R.A.M.*, 32, p. 471] in Kiuru wheat, while certain species of *Fusarium* (the most common being *F. avenaceum* [25, p. 13] and *F. culmorum* [loc. cit.]) also induced foot rot symptoms; *F. scirpi* and its var. *filiferum* [loc. cit.] were recorded for the first time in Finland. Plants inoculated with a mixture of *C. herpotrichoides* and the moderately virulent *F. avenaceum*

contracted more severe infection than did those inoculated with either singly [cf. 32, p. 180]. Of 523 samples of spring wheat from 104 provinces in Finland, 459 had eyespot infection. Other hosts of *C. herpotrichoides* in Finland are *Agropyron repens*, *Alopecurus pratensis*, *Festuca pratensis*, *F. rubra*, barley, *Poa annua*, *P. pratensis*, and rye, which is seldom attacked.

Present also in the stems of plants with shrivelheads were the larvae of the chalcid fly *Amblymerus graminum*. This appears to contribute to about 10 to 13 per cent. of the disease. Only in coastal areas is it more important than eyespot.

Information is presented on the morphological and cultural characters and physiological requirements of *C. herpotrichoides*. The optimum temperature for growth *in vivo* was 5° to 9° C., much lower than for other foot and root parasites of wheat [16, p. 30]. In manurial tests in 1946 none of the fertilizers or manures applied had any alleviating effect on the disease. In varietal trials only Diamond I showed any resistance and that was slight. Rotations avoiding cereals and grasses appear to be the only solution. The destruction of *Agropyron repens* on farms is recommended. [Many of the papers listed in the nine-page bibliography have already been noticed in this *Review*.]

HAGBORG (W. A. F.). **Dwarfing of Wheat and Barley by the Barley stripe-mosaic (false stripe) virus.**—*Canad. J. Bot.*, 32, 1, pp. 24–37, 3 pl. (1 col.), 1 graph, 1954.

Intensive studies since 1951 at Winnipeg, Manitoba, on the effect of barley stripe mosaic virus (false stripe) on wheat and barley [*R.A.M.*, 33, pp. 139, 532] established the identity of the disease with that described and named by Connors in 1925 and reported by McKinney to be of virus origin [30, p. 408]. It occurs in the four western provinces of Canada and in Ontario, Prince Edward Island, Nova Scotia, and the mid-western United States.

Under greenhouse conditions a few barley and wheat seedlings died within six weeks of sap inoculation; most of them, however, survived until maturity but were smaller and had fewer tillers than healthy plants. The reduction in vigour was less marked in plants inoculated at heading time than as seedlings.

In field experiments in 1952 large and statistically significant reductions in the height of crop, kernel weight, and grade of Redman and H–44–24 wheat resulted from early inoculation, but not from late. Wheat yields were reduced by 75 per cent. and those of Plush barley by 63 per cent. The seed-borne nature of the virus was confirmed.

The possibility of the disease having been a factor in the unthriftiness of wheat fields in Manitoba and Saskatchewan in 1951 is discussed.

WELSH (J. N.), PETURSON (B.), & MACHACEK (J. E.). **Associated inheritance of reaction to races of crown rust, Puccinia coronata avenae Erikss., and to Victoria blight, Helminthosporium victoriae M. and M., in Oats.**—*Canad. J. Bot.*, 32, 1, pp. 55–68, 1 pl., 1954.

At Winnipeg, Manitoba, studies of advanced generation oat selections and of crosses involving varieties of Victorian parentage indicated that Victoria has more than one major gene for resistance to crown rust [*Puccinia coronata*: *R.A.M.*, 33, p. 475]. From Garry and from F_3 populations of different crosses lines were obtained with the following three types of disease reaction: (1) susceptible to Victoria blight (*Helminthosporium victoriae*) [33, pp. 345, 597] and resistant to all the *P. coronata* races studied, viz., 1 to 6, 24, 34, 34A, 38, 45, and 57; (2) resistant to *H. victoriae* and susceptible to *P. coronata* races 4, 5, 34A, and 57 but resistant to the others; and (3) resistant to *H. victoriae* and susceptible to all *P. coronata* races. Inheritance studies of the crosses Garry × Exeter, Garry × Roxton, and Roxton × R.L. 1987 indicated that susceptibility to *H. victoriae* is dominant and governed by a single

major gene; that resistance to races 4, 5, 34A, and 57 of *P. coronata* is dominant and governed by a single major gene, but linked with susceptibility to *H. victoriae*; and that resistance to race 45, as well as 1, 2, 3, 6, 24, 34, and 38 which appear to be similar to race 45 in inheritance, is conditioned by three dominant genes, one of which is associated with susceptibility to *H. victoriae*.

Rosen (H. R.). **Breeding cereal crops for the control of diseases.**—*Proc. Ark. Acad. Sci.* 5, pp. 75–76, 1952. [Mimeoprinted.]

In 1936 a breeding programme was initiated at the Arkansas Agricultural Experiment Station, primarily for the control of crown rust [*Puccinia coronata*], smuts [*Ustilago avenae* and *U. kolleri*], and other diseases of oats. A new race of *P. coronata*, discovered in 1949 and provisionally numbered 101, threatens nearly all the commercial varieties commonly cultivated in the State. Traveler, combining winter-hardiness with resistance to the races of crown rust and smuts prevalent at the time of its release in 1944, has since proved susceptible to race 101 of *P. coronata*, new races of smuts, a new virus disease, and *Helminthosporium* blight [? *Pyrenophora avenae*: *R.A.M.*, 32, p. 309]. The last-named, however, is troublesome only at temperatures above 70° F. and may be combated by sowing two or three weeks later than usual in the autumn, crop rotation, and seed treatment with an organic mercury compound.

Miles (L. G.) & Rosser (D.). **Bovah—a new grazing Oat for Queensland.**—*Qd agric. J.*, 78, 6, pp. 311–315, 5 figs., 1954.

Oat crown rust [*Puccinia coronata*: *R.A.M.*, 18, p. 239], which has been very severe on fodder crops in some years in Queensland, was successfully controlled by the introduction of the resistant varieties Vicland and Fultex, effectively replacing the susceptible Belar and Algerian which were total failures in wet winter seasons. With the recent appearance in Queensland of Victoria blight [*Helminthosporium victoriae*: 33, p. 209], to which the two new introductions are susceptible, it has been necessary to develop a new variety, Bovah (Bond × Victoria × Hajira), with resistance to both diseases. In field trials in 1950 when crown rust was moderately severe Vicland, Fultex, and Bovah were all superior to Algerian, while in 1952 Victoria blight was very severe on Vicland and Fultex, but Bovah and Algerian gave a very good performance.

Viennot-Bourgin (G.) & Zieglé (Jeannine). **La carie des grains de Seigle en France.** [Bunt of Rye grain in France.]—*C.R. Acad. Agric. Fr.*, 38, 18, pp. 729–730, 1952.

At the end of July, 1952, *Tilletia secalis* attacked small plots of rye [*R.A.M.*, 7, p. 159; 19, p. 12; 30, p. 432] growing at an altitude of about 1,850 m. in the Hautes-Alpes on an exposed mountainside in the Cristillan valley below the village of Tioure. This constitutes a new record for France. Straw length was reduced by about 40 per cent. All the spikes on a plant were affected and there was typical distortion of the caryopses.

The spores were larger than those of *T. caries* and had more pronounced reticulations. They do, however, exhibit certain similarities to those of *T. decipiens* [25, p. 26] on *Agrostis*, *T. controversa* [26, p. 173] on *Agropyron intermedium*, which is abundant in many parts of the area, and *T. brevifaciens* [33, p. 473].

Gheorghianov (V.) & Fischer (G. J.). **El carbón del Maíz. Observaciones complementarias.** [Maize smut. Supplementary observations.]—*Arch. fitotéc. Urug.*, 5, 1, pp. 119–129, 9 graphs, 1952. [English summary, p. 175.]

This paper on *Ustilago zeae* [*U. maydis*] and *Sphacelotheca reiliana* in Uruguay has been noticed from another source [*R.A.M.*, 33, p. 591].

Kendrick (E. L.). **The influence of environment on the physiology and pathogenicity of Pythium species on Corn seedlings.**—Abs. in *Phytopathology*, 43, 9, p. 477, 1953.

In comparative experiments on the pathogenicity of the species of *Pythium* implicated in maize seed decay and seedling blight [in Wisconsin] at 4°, 8°, 12°, and 16° C., *P. aphanidermatum* caused severe infection at all temperatures; *P. irregulare*, *P. debaryanum* [*R.A.M.*, 32, p. 553; 33, p. 477], and *P. ultimum* were similar to each other and slightly less pathogenic than *P. aphanidermatum*; *P. arrhenomanes* [32, pp. 77, 479 and following abstracts] was most virulent at 12° and 16°; and *P. splendens* produced moderate damage throughout the range. Inoculated at 8°, *P. arrhenomanes* and *P. debaryanum* were appreciably less pathogenic than *P. aphanidermatum* and *P. irregulare*. At a high moisture-level *P. debaryanum*, *P. irregulare*, and *P. aphanidermatum* were comparable in pathogenicity, but as moisture was reduced *P. debaryanum* became markedly less virulent, while the other two remained equally injurious. In tests on resistant maize hybrids the interspecific differences in pathogenicity were accentuated.

Johnson (L. F.). **Antibiosis in relation to Pythium root rot of Sugarcane and Corn.**—*Phytopathology*, 44, 2, pp. 69–73, 2 figs., 2 graphs, 1954.

This is an expanded, tabulated survey of the results of studies at Louisiana State University on the antagonism of soil fungi and actinomycetes to *Pythium arrhenomanes*, the agent of root rot of maize [see preceding and next abstracts] and sugarcane, preliminary accounts of which have already been noticed [*R.A.M.*, 32, p. 372]. The actinomycetes were the principal inhibitors of the pathogen in the soil.

Luke (H. H.) & Johnson (L. F.). **Preliminary studies on an antibiotic produced by a species of Penicillium.**—Abs. in *Phytopathology*, 43, 9, p. 479, 1953.

Significant control of maize root rot (*Pythium arrhenomanes*) [see preceding abstracts] was obtained when a culture of *Penicillium* isolated from soil near Baton Rouge, Louisiana, was incorporated in sterilized soil inoculated with the pathogen. In agar culture it also inhibited a number of other plant pathogens, including species of *Rhizoctonia*, *Helminthosporium*, *Fusarium*, *Colletotrichum*, *Sclerotium*, *Sclerotinia*, *Alternaria*, *Diplodina*, *Dendrophoma*, and *Ascochyta*. Culture filtrates containing the antibiotic withstood 40 minutes' heating at 100° C.

Tessi (J. L.). **Enfermedades de los Sorgos en la Argentina I. Physoderma sp., un nuevo parásito de los Sorgos.** [Diseases of Sorghum in Argentina I. *Physoderma* sp., a new Sorghum parasite.]—Reprinted from *Idia*, 5, 57, 2 pp., 2 figs., 1952.

During the summer of 1952 an apparently new disease caused by a *Physoderma* sp. was observed first on *Sorghum sudanense* and *S. almum* at the Institute of Phytotechnology, Castelar, Argentina, and later on different kinds in other parts of the country. The symptoms were of two types and chiefly confined to the leaves, though the petioles were sometimes affected. One type was characterized by red to purple, round spots developing over the whole leaf surface, reaching a diameter of 1 mm., and sometimes coalescing. Older lesions were covered by a light chestnut-coloured powder, composed partly of zoosporangia. In the other type of infection there are large, irregular, greyish-green lesions, generally commencing at the leaf tips and margins and gradually involving the whole surface, which becomes necrotic.

In some respects the disease resembles brown spot of maize caused by *P. zeae-maydis* [*P. maydis*], known to have been present in Argentina for some years

[C.M.I. map No. 106], and may possibly prove to be caused by a subspecies pathogenic only to sorghum.

Tessi (J. L.) & Frecha (J. H.). **Enfermedades de los Sorgos en la Argentina II. Tres enfermedades producidas por bacterios.** [Diseases of Sorghum in Argentina II. Three diseases caused by bacteria.]—Reprinted from *Idia*, 5, 58, 4 pp., 7 figs., 1952.

Full descriptions are given of the symptoms and distribution of three bacterial diseases on different varieties of sorghum in Argentina, one of which (*Pseudomonas andropogoni*) has already been reported there [*R.A.M.*, 31, p. 487]. Of the two new records *Xanthomonas holcicola* [cf. above, p. 657] occurs chiefly on broom-corn [*Sorghum bicolor* var. *technicus*] but also attacks *S. almum* in the provinces of Buenos Aires, Santa Fe, Presidente Perón, and Entre Ríos, and the Argentine territory of Formosa. *P. syringae* [29, p. 207] is frequent on Sudan grass [*S. sudanense*] in Castelar, but does not cause much damage. In other regions it has been observed on this host and *S. almum*.

The distinctions between these diseases and that caused by *Physoderma* sp. [see preceding abstract] are indicated.

Tessi (J. L.) & Frecha (J. H.). **Enfermedades de los Sorgos en la Argentina III. Algunos hongos que parasitan las hojas.** [Diseases of Sorghum in Argentina III. A few fungi attacking the leaves.]—Reprinted from *Idia*, [6], 61, 4 pp., 5 figs., 1953. [Received March, 1954.]

In a further contribution to this series [see preceding abstracts] notes are given on the symptoms, economic importance, and distribution of four leaf diseases of sorghum in Argentina. *Helminthosporium turcicum* [see next abstract] frequently causes severe damage throughout the sorghum areas, particularly on sweet sorghum [*Sorghum saccharatum*] in the La Carlota and Río Cuarto areas of Córdoba province. *Ramulispora sorghi* [loc. cit.] has appeared only recently and is confined to the coastal areas of north-eastern Santa Fe and eastern Presidente Perón. *Gloeocercospora sorghi* [loc. cit.] occurs to a moderate extent on Sudan grass [*S. sudanense*], *S. saccharatum*, and certain grain sorghum varieties in the central and northern coastal regions. A fungus resembling *Colletotrichum graminicola* [loc. cit.; *R.A.M.*, 33, p. 534], but awaiting definite confirmation, produces small, oval, reddish spots, generally well scattered, on the leaves only. The spots turn chestnut in the centre, leaving the borders red, or they may be dark grey from the outset. The production of acervuli in favourable environmental conditions is a characteristic feature of the disease. On account of its wide distribution, frequent occurrence, and record of damage in other countries, varietal tests are envisaged.

Muntañola (Maria). **Parásitos criptogámicos de los Sorgos en la provincia de Tucumán (nota preliminar).** [Fungal parasites of Sorghum in the province of Tucumán (preliminary note).]—*Rev. argent. Agron.*, 19, 4, pp. 220–230, 5 figs., 1952. [English summary.]

Notes are given on the symptoms and morphology of twelve pathogens attacking sorghum in Tucumán, Argentina [see preceding abstract]. New to the country are *Phoma insidiosa* [*R.A.M.*, 33, p. 599], widely distributed but not serious; *Cercospora sorghi* [30, p. 565], which reaches its greatest intensity at the end of the vegetative period, and *Puccinia purpurea* [see above, p. 660] (previously erroneously identified as *P. sorghi* according to Marchionatto), which attacks all plantings early in the season, causing severe damage as the season advances; some of the pustules are parasitized by *Darluca filum* [20, p. 570]. *Gloeocercospora sorghi* [33, p. 599 and preceding abstract], first observed in an experimental planting of sorghums from various sources in 1951, is favoured by high temperatures

and relative humidity; *Ramulispora sorghi* [loc. cit.], also observed first in 1951, was on material from Buenos Aires and in 1952 it attacked varieties of *Sorghum saccharatum* and *S. sudanense* in the field. *Helminthosporium turcicum* [C.M.I. map No. 257 and preceding abstract] is also common and often severe in all plantings, particularly of forage varieties. *Colletotrichopsis graminicola* n.comb. (*Colletotrichum graminicola*) [loc. cit.] occurs only on the leaves, sheaths, and stalks in Tucumán, never causing foot rot as it does elsewhere. The transfer is made in accordance with Marchionatto's suggestion that all species with subepidermal or erumpent acervuli and fusoid, apiculate, curved conidia should be included in *Colletotrichopsis* [28, p. 248].

Peturson (B.). **The relative prevalence of specialized forms of Puccinia coronata that occur on Rhamnus cathartica in Canada.**—*Canad. J. Bot.*, 32, 1, pp. 40–47, 2 pl., 1954.

This information, with the exception of the Latin diagnosis for *Puccinia coronata* f.sp. *secalis*, has already been noticed from another source [*R.A.M.*, 32, p. 674].

Dubinevich (B. N.). Протравление семян Гречихи гранозаном перед посевом. [Pre-sowing treatment of Buckwheat seed with granosan.]—Земледелие [*Zemledelie, Moscow*], 2, 3, pp. 106–107, 1954.

In experiments carried out in the Kiev region of the U.S.S.R. for the control of buckwheat grey mould (*Botrytis* sp.) by seed treatment (all at 2 gm. per kg. seed), granosan, alone and combined with GHTsG, was the most effective, followed by thiram and zinc trichlorophenolate. All increased yield and reduced infection to below 5 per cent., as against 26·5 and 9·3 per cent. for the untreated in 1950 and 1952, respectively, there being no infection in 1951. The results of the 1953 field trials with granosan, using the buckwheat variety Bogatuir, confirmed these findings.

Pasinetti (L.). **Sulle vere cause determinanti il 'mal secco' degli Agrumi e su nuovi orientamenti terapeutici.** [On the true causes of Citrus mal secco and new therapeutic measures.]—Reprinted from *Ann. Fitopat.*, 1, 3, 65 pp., 13 pl., 5 figs., 1952. [French, English, and German summaries.]

Diagnostic researches carried out over three years on numerous citrus trees in Sicily as well as anatomical, histological, radiological, and microbiological investigations (mostly on lemon) lead the author to refute the claims of Petri and subsequent workers that mal secco is of parasitic origin (caused by *Deuterophoma tracheiphila*) [*R.A.M.*, 32, p. 125]. He states that the condition is due to alterations in the root system, leading to occlusion of the water-conducting vessels, produced by the nature and physico-chemical constitution of the soil. He argues that if the condition were really caused by a fungus of the virulence credited to *D. tracheiphila* the symptoms would hardly be limited to a few twigs on a single branch, and in a planting there would be more trees affected than the usual few surrounded by healthy ones that succumb only slowly. With a true epidemic the disease would spread very rapidly, leaving perhaps just a few particularly resistant individuals. Furthermore, with an infectious and contagious disease the symptoms would not start exclusively at the apex of a tree as occurs with mal secco.

Functional disturbances of the root in various types of soil take the form of rot in compact or clayey soil, hypertrophy and slight rotting in tufaceous and lateritic soils, atrophy in tufaceous soils with an insufficiently deep cultivable topsoil or in volcanic soils, and a type of atrophy with lesions produced by accidental causes, such as the application of freshly gathered sheep dung or ammoniacal salts to the roots and the total lack of humus. Suggested methods of improvement

are: the establishment of humus reserves in seriously deficient soils; amelioration by the replacement of the existing soil with an enriched variety; the application of a balanced fertilizer suited to the need of the tree and the composition of the soil, combined with rational use of micro-elements; the avoidance of irrigation with cold water and that containing nitrogen salts; the application of colloidal sprays before the sirocco and at periods of intense transpiration; and the building up of resistance by choosing stocks and scions raised in normal soil moisture conditions.

In no case, using Petri's methods, did the author obtain from the affected tissues any organism resembling *D. tracheiphila*. *In vitro* cultures of epidermal and subepidermal tissue bearing pycnidia alleged to be typical of *D. tracheiphila* developed only *Colletotrichum gloeosporioides*. When pure cultures of *D. tracheiphila*, obtained from the Cryptogamic Laboratory, Pavia, were inoculated into five- to six-year-old plants grown under optimum conditions there were no infections. A few plants not grown under ideal conditions developed chlorosis and apical wilting of the branches with the typical reddish wood discoloration, but no fungus could be detected [cf. 33, p. 600]. The root showed signs of hypertrophy. From these experiments the author concludes that the cultures were, in fact, of the well-known saprophyte *C. gloeosporioides*, with which mal secco is associated, or more correctly *Phoma limonis* f. *gloeosporioides* [cf. 25, pp. 445, 492, 498] which is an imperfect form of *Glomerella cingulata*.

Goidànich (G.) & Ruggieri (G.). **Il 'mal secco' degli Agrumi.** [Mal secco of Citrus.] Reprinted from *G. Agric.*, *1953*, 3, 14 pp., 7 figs., 1953. [Received March, 1954.]

The authors review and reassert, step by step, current opinion concerning the cause and parasitic nature of citrus mal secco (*Deuterophoma tracheiphila*) [*R.A.M.*, 33, p. 227] in view of certain contrary opinions expressed recently [see preceding abstract]. There is a bibliography of 47 titles.

Nesterenko (G. A.). Борьба с заболеванием Цитрусовых мальсекко. [Control of Citrus mal secco disease.] —Сад и Огород [*Orchard & Garden*], *1954*, 4, pp. 49–50, 1954.

Citrus mal secco [*Deuterophoma tracheiphila*: *R.A.M.*, 33, p. 600] was first recorded in Gruzia, U.S.S.R., in 1940. The symptoms, detection [loc. cit.], and control are briefly described. Infected parts of the tree should be removed and burnt and the cuts treated with 5 per cent. Bordeaux mixture. Spread of the disease in an infected plantation was reduced by spraying with 3 per cent. Bordeaux during vegetative growth and after harvest and with 1 per cent. after flowering and at the end of August and beginning of September.

Fletcher (W. A.). **Use of diphenyl wraps against decay in N.Z. Lemons.**—*N.Z. J. Agric.*, 88, 2, pp. 115, 117, 119–120, 4 figs., 1954.

Trials at the Department of Agriculture, Auckland, New Zealand, for the control of lemon fruit rots in storage, largely due to species of *Penicillium* and to *Phomopsis* [*Diaporthe*] *citri* [*R.A.M.*, 27, p. 116], have shown that dipping lemons into 2,4,5-T [33, p. 350] and wax and wrapping them individually in diphenyl wraps (of American manufacture) [33, p. 349] significantly reduced lemon wastage and prolonged the life of the fruit. Lemons stored for four months at room temperature remained surprisingly bright and fresh [cf. above, p. 658].

Kozlova (Mme V. I.). Псорозис — опасное заболевание Цитрусовых. [Psorosis—a dangerous disease of Citrus trees.]—Сад и Огород [*Orchard & Garden*], *1954*, 4, p. 51, 1954.

Symptoms of citrus psorosis virus [*R.A.M.*, 31, p. 14] are described and the

importance of using healthy grafting material is emphasized, following the detection of the disease in the U.S.S.R. [loc. cit.].

SCHNEIDER (H.). **Anatomy of bark of bud union, trunk, and roots of quick-decline-affected sweet Orange trees on sour Orange rootstocks.**—*Hilgardia*, 22, 16, pp. 567–581, 4 figs. (1 col.), 2 graphs, 1 diag., 1954.

Anatomical changes occurring at the bud union and in the trunk and roots of 15-year-old Valencia orange trees on sour orange stocks naturally infected with the quick decline virus [*R.A.M.*, 33, p. 601 and following abstracts] were studied at the California Citrus Experiment Station, Riverside. The first anatomical symptom detected was necrosis of the sieve tubes (the youngest first) and companion cells immediately below the bud union. This was followed by hypertrophy and division (once or twice) of the adjacent parenchyma cells; degeneration of the older sieve tubes and companion cells above the union; an over-production of phloem at the union, where phloem cells are smaller than normal; occasional production of callus-like tissue above the union; thickening and lignification of the walls of ray cells which become hyperplastic below the union; and the occasional presence of inclusion bodies in parenchyma cells at the union. A narrow band of normal, functioning phloem is present $\frac{1}{4}$ in. above and immediately below the union (average width below, 70 μ). One inch above the union the phloem remains normal until the tree deteriorates. Sieve tube necrosis and parenchyma hypertrophy also occur occasionally in the roots.

Most of the trees contain some functioning sieve tubes throughout the year, except in the spring when phloem formation begins and necrosis is almost complete. Phloem production at the bud union is greater and continues for longer in diseased than in healthy trees. Necrosis appeared in two- to three-year-old orange trees within seven months of inoculation by budding.

SCHNEIDER (H.). **Condition of phloem of sour Orange tree trunk in winter.**—*Hilgardia*, 22, 16, pp. 583–591, 2 figs., 1954.

In further studies in this series [see preceding and next abstracts] it was found that throughout the winter months the trunks of healthy sour orange trees or stocks maintain a band of functioning phloem 500 μ or more in width, which is on the average about 100 μ narrower than in sweet orange. Degenerating external phloem is absent or up to 100 μ in width and occasionally there are unusually wide bands of degenerating phloem or necrotic sieve tubes in the functioning phloem.

In general the use of sour orange as a root stock induces no anatomical changes in the trunk phloem.

SCHNEIDER (H.). **Effect of trunk girdling on phloem of trunk of sweet Orange trees on sour Orange rootstock.**—*Hilgardia*, 22, 16, pp. 593–601, 1 fig., 1954.

In experiments on artificial girdling (bark ringing at the bud union) of orange tree trunks at the California Citrus Experiment Station, Riverside, treatment usually caused degeneration of the sieve tubes, the older ones being affected first [cf. preceding abstracts]. Degeneration was more rapid and extensive $1\frac{1}{2}$ in. above and below the union than at 18 in. Degeneration set in after two weeks in trees girdled in July and in six months in those treated in October. Degeneration above the union in healthy girdled orange trees was identical with that appearing naturally in trees suffering from quick decline [loc. cit.], but the symptoms induced by artificial girdling differed from the condition recently found in lemon trees [cf. *R.A.M.*, 32, p. 555] where the sieve tubes of the scion become necrotic but those of the stock immediately below the union remain functional.

Verona (O.). **Malattie da carenza in piante di Agrumi.** [Deficiency disorders in Citrus plants.]—Reprinted as *Boll. tec. Ist. Pat. veg. Pisa* 6, 1952, from *Ital. agric., 1952*, 11, 5 pp., 1 col. pl., 1952. [Received March, 1954.]

Notes are given on the symptoms of the various mineral deficiencies of citrus in Italy and elsewhere [cf. *R.A.M.*, 32, p. 429; 33, p. 479], with a key to their diagnosis. A bibliography of 71 titles is appended.

Bachy (A.). **Contribution à l'étude de la pourriture du cœur du Palmier à Huile.** [Contribution to the study of heart rot of the Oil Palm.]—*Oléagineux*, 9, 8–9, pp. 619–627, 7 figs., 10 graphs, 1954.

Further studies on heart rot (little leaf) of oil palms, at the Institut de Recherches pour les Huiles et Oléagineux, Sibiti, Middle Congo [cf. *R.A.M.*, 32, p. 373; 33, p. 536], indicated that it originates from a hormonal disequilibrium which is expressed as anomalous growth. The exact cause of the disorder has not yet been ascertained but it is believed to be connected with reduced photosynthetic activity and poor translocation of the sap during the prolonged dry season.

Saccas (A. M.). **La flétrissure des Cotonniers du Tchad due à Olpidiaster (Asterocystis) gossypii n.sp.** [The wilt of Cotton in Tchad due to *Olpidiaster* (*Asterocystis*) *gossypii* n.sp.]—*Cot. et Fibr. trop.*, 9, 1, pp. 23–55, 2 col. pl., 23 figs., 1954.

In 1952 cotton growing at the Stations of Ba-Illi and Bebedjia, French Equatorial Africa, and in a few native plantations in the same area developed a wilt, which reappeared in the following year at the same period (1st to 30th September) in the same localities and in other areas, including places where cotton was being grown for the first time. The plants became affected when the first flower buds formed or later, incidence subsequently declining, especially during the dry period. Yellowish, interveinal stripes, or greenish spots, or marbling visible by transmitted light appeared suddenly on the basal leaves. The symptoms then spread upwards; all the leaves withered and fell; the branches and finally the stem died. The disease usually developed very rapidly, especially if the appearance of the initial symptoms coincided with a short period of drought; in rainy, humid conditions development was slower. Spread occurred in circles.

Local injuries were present at the tip of the tap root and on the neighbouring rootlets, usually 30 to 60 cm. below the soil surface, and represented the primary points of infection; subsequently they formed discontinuous bands throughout the entire thickness and length of the wood. In the vascular fibres of the central cylinder there were three different forms of discoloration: in 57 per cent. of the plants examined it was brown; in 24 per cent. diffuse reddish-brown, the colour being darker at the edge in the collar; and in 19 per cent. yellow, only the surface layer and the outer layers of the wood in the roots becoming affected, the internal layers being colourless or faintly yellowish. The surface of the roots and collar was wet and in an advanced stage of the disease consisted only of shreds surrounding the central cylinder.

Isolations from affected material yielded *Olpidiaster gossypii* n.sp. [cf. *R.A.M.*, 17, p. 415] which could be cultured only on an agar-infusion of cotton stalks and leaves. Sporangia were present in the outer layers and central cylinder of plants at all stages of wilt. The zoospores measured 2·5 to 5 μ in diameter and the single flagellum was 15 to 17 μ long. The intracellular, globular to subglobular zoosporangia were 8 to 35 μ in diameter. The star-like resting sporangia formed only in dying or dead tissues; they were 8 to 18 (mostly 12 to 14) μ in diameter.

There was no cellular hypertrophy or proliferation, only disorganization of the cytoplasm, hypertrophy of the nucleus and the death of the cell, and sometimes

an abnormal thickening of the cell wall. Tyloses obstructed the vessels and accelerated the death of the plants.

All varieties of cotton cultivated in Tchad appeared to be susceptible; the losses sustained in 1953 were insignificant, but higher than in 1952. Soil humidity plays the chief part in the development and spread of the fungus, which was ascertained to grow in soils of pH 7·2 to 8·3.

In the author's opinion seed transmission is unlikely, infection being invariably from resting sporangia in the soil. The disease has probably been present in Tchad for some years sporadically, but has escaped detection; conditions have recently favoured it. That it occurred in fields not previously planted with cotton suggests that the fungus is not specific to cotton, but has been present on various wild hosts.

The author recommends, provisionally, that cotton should not be grown for some years in soil known to be infested; late sowing should be avoided; and all wild, herbaceous plants and infected cotton should be destroyed. Efforts should be made to develop resistant or tolerant varieties.

Lagière (R.). **Conservation et traitement des semences du Cotonnier. II. Exposé des résultats obtenus à la Station I.R.C.T. Bambari.** [Storage and treatment of Cotton seed. II. Report of results obtained at the I.R.C.T. Station, Bambari.] —*Cot. et Fibr. trop.*, 9, 1, pp. 97–127, 1 graph, 1954.

In further work in this series [cf. *R.A.M.*, 33, p. 537] seed disinfection tests were carried out on the Banda I (Triumph) cotton variety at five different stations in French Equatorial Africa, a brief account of which has already been reported [33, p. 602]. During periods of one to five years granosan H and granopera gave, respectively, 28 and 26 per cent. increased emergence and stand (up to 30 days), as compared with the untreated (average of five years' results). They also increased stands 140 days after emergence by 15·7 and 12·5 per cent. respectively, the figure for new improved granosan being 12·7 (average of five years). The corresponding increases in production of seed cotton were, respectively, 11·4, 10·2, and 9·2 per cent. The treated seed was kept in sacks in good storage conditions before use [loc. cit.]. When the treated seed was kept in unsatisfactory conditions granosan, new improved granosan, and granopera increased production of seed cotton by 25, 25, and 70 per cent., respectively.

Other work showed that delinting the seed with sulphuric acid is in itself an effective method of disinfection. In 1949–50 acid delinted seed sown on 5th July averaged 30·4 per cent. germination ten days after sowing, as against 23·6 per cent. for untreated; the corresponding figures for seed sown on 5th August were 33·8 and 28·3 per cent. In 1949 acid delinting increased germination, favoured the inception of vegetation, and thereby increased production. In spite of delinting damping-off [loc. cit.] was more important in the late than in the early sowing, though it was less than in non-delinted seeds. In 1950 acid delinting did not give satisfactory results as the seed was of poor quality. If the seed has ripened properly, acid delinting is advantageous, but the practice is not recommended in Ubangui-Chari, where the climate is too variable. If a considerable period elapses between delinting and sowing, the seed having been thoroughly dried and suitably neutralized, dusting with a fungicide may be necessary to protect it against saprophytes. Bioquin 1, phygon XL, dithane Z–78, and granopera are recommended. The disinfection of seed to be sown late increases production only slightly.

Seed disinfection with granopera or granosan M increased production by an average of 10 per cent., the net financial gain after deducting cost of treatment being more than equal to the total cost of the treatment.

It is concluded that in view of the climatic conditions prevailing at Bambari, which favour fungal and bacterial epidemics, losses of cotton seed by deleterious organisms will be reduced if drying and aeration before storage are improved.

When an optimum state of dryness has been attained, the seed, treated with an effective, polyvalent dust, may be stored in heaps; during the five months' storage only slight losses will be sustained. If the water content of the seed is 11 per cent. or more of the fresh weight, retention of viability is uncertain; the seed should be disinfected and stored in thin layers (15 to 25 cm. deep) or in bags. Seed dusting does not reduce the germinative capacity if the rates used range from 0·3 to 0·5 per cent. Proper pre-storage treatment increases production by about 35 per cent.

Lagière (R.) & Guyot (J.-L.). **Classement des graines de Cotonnier selon leur densité dans l'eau — qualités et infections des deux fractions.** [Grading of Cotton seeds according to their density in water—qualities and infections of the two fractions.]—*Cot. et Fibr. trop.*, 9, 1, pp. 128–138, 1954.

The grading of cotton seed from French Equatorial Africa by density in water, the seed having been delinted in concentrated sulphuric acid for 45 minutes [see preceding abstract], gave the following results (average of soaking periods of 5, 10, 20, and 30 minutes in water): variety Samaru 26 C, 85·4 per cent. floating seeds with 84·1 per cent. germination; N'Kourala 42–5, 89·6 and 75·3; and Banda II, 98·7 and 50·7; the corresponding germination percentages for seeds heavier than water were 95·8, 92·8, and 95·8. From these averages (based on 6,000 seeds for each variety) it is concluded that (1) the proportion of 'light' seeds is related to the variety; (2) the percentage of healthy, viable seeds is also related to the variety and bears no relation to the proportion floating; (3) a weak varietal germinative ability does not necessarily follow from a high proportion of floating seeds; and (4) the separation of acid delinted seeds into floaters and non-floaters serves no useful purpose.

When lots of 200 apparently healthy, acid delinted seeds (60-minute dip) were disinfected, classified into floating and submerged, and placed on nutrient agar, 29·1 and 17·1 per cent., respectively, were found to be infected. Fungi infected 9·9 and 10·2 per cent., respectively, and bacteria 19·2 and 6·9 per cent., respectively. The proportions of seeds infected by bacteria in the three varieties were as follows: (1) variety regularly susceptible to *Xanthomonas malvacearum* [*R.A.M.*, 33, p. 602] 20·6 and 0 per cent. for the 'light' and 'heavy', respectively; (2) variety on the whole susceptible, but heterogeneous, 30 and 8·6 per cent.; and (3) a moderately resistant variety 7 and 12·2 per cent.

The elimination of floating seeds in varieties susceptible to *X. malvacearum*, considered as a prophylactic measure, helps to reduce the number of centres of primary infection by bacteriosis.

The fungi isolated included *Rhizopus nodosus*, *Nigrospora gossypii*, *Botryodiplodia theobromae*, *Aspergillus japonicus*, *A. flavus*, *Brachysporium gossypii*, *Curvularia* sp., *Cladosporium* sp., and *Paecilomyces varioti*.

Crandall (B. S.) & Lynn (H. D.). **The resistance of Kenaf varieties, hybrids, and relatives to anthracnose.**—*Plant Dis. Reptr*, 38, 4, pp. 311–313, 1954. [Multilithed.]

In trials conducted by the Co-operative Fibre Commission, Havana, Cuba, in 1952–3 the reactions of Kenaf (*Hibiscus cannabinus*) varieties to anthracnose (*Colletotrichum hibisci*) [*R.A.M.*, 33, p. 354] were determined by needle-inoculations under conditions most favourable for the disease, i.e., during flowering and in the cooler winter weather. El Salvador [loc. cit.] was the least susceptible variety, with 44 per cent. infection; Tingo Maria had 95 per cent. but is often much more resistant in the field. Inheritance of resistance is apparently controlled by more than one pair of recessive genes.

Four selections, PI–159886, PI–182835, STBNO–12, and STBNO–44, of fibre

roselle (*H. sabdariffa* var. *altissima*), though free from natural attack, were completely susceptible when inoculated. The disease, however, is not as severe as on kenaf. Edible roselle (*H. sabdariffa*) was highly resistant. *H. diversifolius*, *H. abelmoschus*, *H. costatus*, *H. esculentus*, *H. rosa-sinensis*, cotton (*Gossypium hirsutum* and *G. barbadense*), *Urena lobata*, *Sida rhombifolia*, *S. cordifolia*, and *Abutilon angulatum* were all immune.

ELOJA (A. L.). **Control of weeds and destruction of diseased Abacá plants with herbicides.**—*Philipp. Agric.*, 36, 10, pp. 474–491, 4 figs., 1953. [Received July, 1954.]

In experiments from December, 1951, to February, 1953, at the Central Experiment Station, Laguna, Philippines, one spray application of 1·5 or 2 per cent. 2,4-D herbicide to entire stools or cut stalks of abaca [*Musa textilis*: cf. *R.A.M.*, 32, p. 482] suffering from [abaca] bunchy top [virus] disease [30, p. 319] killed them in three to four weeks but did not prevent the emergence of suckers. A second application at the same concentration killed the stools completely.

CROSIER (W. F.) & HEIT (C. E.). **Pleospora herbarum Wallr. and other fungi in seeds of Sweet Alyssum.**—*Plant Dis. Reptr*, 38, 4, pp. 286–289, 1 fig., 1954. [Multilithed.]

At the Department of Seed Investigations, New York State Agricultural Experiment Station, Geneva, perithecia of *Pleospora herbarum* developed on one-quarter to one-half of the dead seeds of *Lobularia maritima* in a poor-quality sample in the germinator. At least 10 per cent. were contaminated by *Alternaria tenuis*. It is believed that the death of the seeds or flowers was due directly to neither fungus, but to adverse conditions at some period.

ANDERSON (C. W.). **The Aster ringspot virosis of central Florida.**—*Phytopathology*, 44, 2, pp. 87–92, 2 figs., 1954.

Aster ring spot virus (*Annulus wellmannii*), first observed on California Wonder chilli (*Capsicum frutescens*) in central Florida in the spring of 1950, recurred in the two following seasons. In 1951 it was detected on Azure blue China aster plants from Tampa [cf. *R.A.M.*, 33, p. 469] and on pansy and *Solanum gracile* in the field. The thermal inactivation point of the virus lay between 75° and 80° C. and was reached after 10 minutes' exposure. Among its 15 hosts detected by inoculation were White Burley tobacco and *Nicotiana glutinosa*, which reacted by the development of ring spot symptoms, cucurbits and cucumber (local lesions only), *Tropaeolum majus*, tomato, zinnia, and Blackeye and Black (Sill and Walker's strain) cowpeas, the former variety exhibiting cucumber mosaic-type lesions and the latter [cf. 32, p. 298] both local and systemic symptoms. Aster ring spot virus simulates cucumber mosaic in certain features but differs in inducing no systemic response in cucumber, in the failure of aphid transmission under experimental conditions, and in the absence of immunological relationships. *Allamanda cathartica* and *Gloriosa superba* are reported, apparently for the first time, as natural hosts of cucumber mosaic virus.

DI CARO (S.). **L'alternariosi del Garofano da 'Alternaria dianthicola' Neerg., nuova specie per l'Italia.** [Alternariosis of Carnation caused by *Alternaria dianthicola* Neerg., a species new to Italy.]—Reprinted from *Riv. Ortoflorofruttic. ital.*, 36, 7–8, 8 pp., 3 figs., 1 graph, 1952. [English summary. Received March, 1954.]

This information concerning the occurrence of *Alternaria dianthicola* on carnations in Italy has already been noticed from another source [*R.A.M.*, 32, p. 561].

Chrysanthemums.—*Bull. Minist. Agric., Lond.*, 92 (Fourth edition), 55 pp., 10 pl. (2 col.), 9 figs., 1954.

The section of this bulletin dealing with the symptoms and control of chrysanthemum diseases in Great Britain (pp. 47–49) is essentially the same as that in the previous edition [*R.A.M.*, 31, p. 384].

Botrytis blight of Peonies.—*Seed World*, 75, 1, p. 39, 1954.

The following are the recommended control measures for peony blight in the United States caused by *Botrytis* [*paeoniae*: *R.A.M.*, 28, p. 456] and *Phytophthora* [*cactorum*: loc. cit.]: removing and destroying affected parts when they first appear, drenching the crown and surrounding soil with dithane Z–78 or parzate (both at 2 tablespoonsful per 1 gal. water), and spraying with these solutions weekly until bud-burst.

Batista (A. C.) & Da Silva (J. N.). **Dois novos fungos imperfeitos.** [Two new fungi imperfecti.]—*An. Congr. Soc. bot. Brasil, 1953*, pp. 144–150, 5 figs., 1953.

Cercospora rosigena n.sp. [cf. *R.A.M.*, 33, p. 635], the agent of circular, dark chestnut-coloured, indistinctly zonate spots on both surfaces of rose leaves in Pernambuco, Brazil, is characterized by simple, cylindrical, erect, fuscous, septate conidiophores, 280 to 360 by 4 to 6 μ, and hyaline, cylindrical to elongated, septate, straight or curved conidia, up to 400 by 2 to 4 μ.

Elliott (E. S.). **Diseases, insects, and other factors in relation to Red Clover failure in West Virginia.**—*Bull. W. Va agric. Exp. Sta.* 351T, 65 pp., 16 figs., 1952.

The damage caused to red clover hay and seed crops in West Virginia by fungus diseases [see next abstract] is briefly described in the diseases section (pp. 37–64) of this bulletin. Two important diseases causing the death of mature plants are crown rot (*Sclerotinia trifoliorum*) [*R.A.M.*, 32, p. 487] and root rot (*Fusarium* spp.) [30, p. 470]. Affecting the production of hay are a number of less important diseases, including black stem (*Phoma trifolii*) [13, p. 32], leaf spot (*Stemphylium sarciniforme*) [33, p. 357], powdery mildew (*Erysiphe polygoni*), leaf spot (*Pseudopeziza trifolii*), anthracnose (*Kabatiella caulivora* and *Colletotrichum trifolii*) [32, pp. 386, 387], sooty blotch (*Cymadothea trifolii*), and rust (*Uromyces trifolii fallens*). Information about the black patch disease, which is one of the major factors limiting seed production of red clover in West Virginia, has been noted from another source [31, p. 286].

Elliott (E. S.). **Notes on forage plant diseases observed in northern West Virginia during 1953.**—*Plant Dis. Reptr*, 38, 4, pp. 279–281, 1954. [Multilithed.]

This list of diseases of lucerne, clovers [see preceding abstract], *Medicago lupulina*, *Lotus corniculatus*, and grasses in northern West Virginia is based on observations made during 1953. The severity and distribution of each disease are given.

Meiners (J. P.). **Grass diseases on new hosts in the Pullman Nursery Unit of the Soil Conservation Nurseries.**—*Plant Dis. Reptr*, 38, 4, pp. 277–278, 1954. [Multilithed.]

As a result of the 1953 inspection of grasses in the Observational Nursery, Pullman, Washington, a number of new host records are given for several fungus pathogens [cf. *R.A.M.*, 32, p. 680].

Goidànich (G.) & Delitala (A.). **Alterazioni delle Mele.** [Disorders of Apples.]—Reprinted from *Ital. agric.*, *1952*, 2, 7 pp., 1 col. pl., 4 figs., 1952. [Received March, 1954.]

Rot caused by *Gloeosporium riessii* [cf. *R.A.M.*, 4, p. 174; 8, p. 512; 33, p. 540]

is one of the most serious diseases attacking apples (chiefly the Abbondanza variety) during the last stages of maturity and in refrigerated storage. It was first observed in Italy in 1949 on apples grown in Emilia. The rot lesions are light brown and surrounded by a halo that is an even lighter brown at first but becomes deep chestnut. Eventually the lesions coalesce to cover the entire fruit and rot the flesh beneath, leaving intact only the seed cavities and seeds. Conidia appear as minute white dots on the surface of the rot. Fruits bearing traces of lesions should not be stored, particularly for long periods, and the storage area should be disinfected before being packed.

Jonathan, Rome Beauty, and Golden Delicious are particularly susceptible to soft scald [33, p. 236] during cold storage. The fruit withstands the disorder better when coated with paraffin oil or when held in an atmosphere containing 17 to 20 per cent. carbon dioxide or kept at 38° C. before putting in refrigerated storage.

Stored apples are also subject to a rot caused by *Phialophora malorum* [26, p. 456; cf. 31, p. 494] (a new record for Italy), characterized by reddish brown spots with dark centres, varying from a few to 15 to 20 mm. in diameter. They are associated with the lenticels or small skin wounds and are either scattered uniformly over the surface or concentrated at the stalk end. In moist conditions the spots on Black Ben Davis coalesce, the flesh beneath becomes soft and watery, instead of the usual spongy consistency, and the whole fruit rots. The fungus also caused heart rot accompanied by an extensive livid brown discoloration in an undetermined winter variety. The whole fruit eventually decomposed.

Forsøg med bekæmpelse af Ferskenblæresyge ved sprøjtning med svovlkalk. [Experiments on the control of Peach leaf curl by spraying with lime sulphur.] —*Medd. Forsøgsv. Plantekult. Kbh.* 497, 2 pp., 1953.

The following results were obtained in 1951 in two series of spraying experiments for the control of peach leaf curl (*Taphrina deformans*) on three varieties (A) near Copenhagen and (B) in Lolland, Denmark, using lime-sulphur (1) a fortnight before and (2) immediately prior to bud burst at concentrations of 5 and 10 per cent.: (A1) 8 and 11 per cent. infection, respectively, for the two concentrations, and (A2) 4 and 2 per cent., compared with 100 on the untreated; (B1) 12 and 6 per cent., and (B2) 3 and 6 per cent., as against 76 per cent. for the controls.

Darpoux (H.). **Efficacité d'un produit à base de N. trichlorométhylthiotétrahydrophtalimide sur la tavelure du Poirier.** [The efficiency of a product based on N. trichloromethylthiotetrahydrophthalimide against Pear scab.]—*Phytiatrie-Phytopharm., 1952*, 2, pp. 13–17, 1952.

In further spraying experiments against scab [*Venturia pirina*: *R.A.M.*, 27, p. 531; 29, p. 570] on Passe-Crassanne pears at Jagny in 1950 and on this variety, Beurré d'Hardenpoint, and Doyenné du Comice at Versailles in 1952, captan (50 per cent. active product at 50 gm. per l.) gave a degree of control comparable with that of 0·75 or 1 per cent. Bordeaux mixture. In 1950 all but 1 per cent. of the captan-sprayed fruit was classed in the two categories (out of six) with least scab, the figure for Bordeaux being 13 per cent., whereas 99 per cent. of the unsprayed was in the three heavily scabbed classes.

On 24th August, 1951, graded 0 to 20, the figures were: captan, 0·5 to 3 leaf scab, 0 to 1 fruit scab; Bordeaux, 2 to 6 and 0 to 5; control, 13 to 18 and 17 to 20. Both were markedly superior to the other materials tested. Captan was innocuous to the leaves and fruit provided that it was not mixed with white oil.

Cohoon (D. F.) & Daines (R. H.). **Some facts about Peach canker.**—Abs. in *Phytopathology*, 44, 2, p. 109, 1954.

Peach cankers caused by *Fusicoccum amygdali* [*R.A.M.*, 33, p. 305 and next

abstract] develop throughout the year [in New Jersey], their numbers reaching a maximum in the spring and autumn. Infection of blossoms is often followed by twig cankers, while scar tissue forms important infection courts from which cankers later arise. Foliar infections have been observed as early as 10th June and their numbers increase as the season advances. The fruits are attacked through injuries of various kinds, including those due to bacterial leaf spot [*Xanthomonas pruni*], and develop symptoms reminiscent in the early stages of brown rot [*Sclerotinia fructicola*], succeeded by the production of black, erumpent pycnidia in the centre of the rotting area.

Daines (R. H.) & Cohoon (D. F.). **Control of Peach canker.**—Abs. in *Phytopathology*, 44, 2, p. 109, 1954.

Owing to the depredations of peach canker (*Fusicoccum amygdali*), few plantings of Golden Jubilee now remain [in New Jersey: see preceding abstract] and the further cultivation of a number of other varieties, including Red Haven and Hale, is threatened. From 1951 to 1953 a dormant spray consisting of 3 lb. monocalcium arsenite, 1½ qts. oil, and 4–6–100 Bordeaux mixture reduced the incidence of spring cankers by 96, 94, and 30 per cent. in the respective years but caused injury to the twigs. In 1953 1½ lb. ferbam, 2 lb. captan, and 1 lb. phygon, applied at the delayed dormant, pink-bud, and full-bloom stages, reduced the percentage of infection in one orchard by 25 to 35, 48 to 62, and 60, respectively. Moreover, a significant diminution in the number of bud cankers resulted from autumn treatments with captan, phygon, and the carbamates.

Ogawa (J. M.), English (W. H.), & Wilson (E. E.). **Survey for brown rot of stone fruits in California.**—*Plant Dis. Reptr*, 38, 4, pp. 254–257, 3 maps, 1954. [Multilithed.]

A survey of brown rot disease (*Sclerotinia fructicola* and *S. laxa*) of stone fruit trees [*R.A.M.*, 33, p. 96] in California, carried out in 1952 and 1953, indicated no major change in distribution since 1939 [cf. 18, p. 533]. *S. fructicola* was, however, found in the counties of Madera, Napa, and Solano and *S. laxa* in San Diego in addition to the more important stone fruit districts. *S. laxa*, the only species isolated from flowering quince, was much more frequent on almond and apricot than *S. fructicola*, while the latter was obtained more often from cherry, nectarine, and peach. Infection of almond hulls by *S. fructicola* was first observed in 1948 in Sutter county and a severe epidemic occurred in 1953 in Butte county. Direct infections of young apricot shoots by *S. laxa* occurred extensively in California for the first time in 1953.

Gilmer (R. M.). **A partial host range of the necrotic ring spot virus in the genus Prunus.**—Abs. in *Phytopathology*, 44, 2, p. 110, 1954.

Bud inoculations with three sources of [cherry] necrotic ring spot virus (one from Wisconsin and two from New York) [*R.A.M.*, 32, p. 367] were performed on 38 species of *Prunus*, all of which except *P. cistena* reacted by the development of typical symptoms. The effects induced by one of the New York strains, CR 5–1, in a clone of *P.* ? *japonica* were suggestive of [cherry] yellow virus and in Albion plum of prune [plum] dwarf virus. Among the hosts determined by these tests were *P. americana*, apricot, wild cherry (*P. avium*), *P. besseyi*, *P. cerasifera* and its var. *pissardii*, Brassington sour cherry, *P. glandulosa*, *P. laurocerasus*, *P. mahaleb*, peach, bird cherry (*P. padus*), 20 varieties of *P. salicina*, *P. serotina*, *P. serrulata*, *P. sieboldii*, *P. tomentosa*, *P. triloba*, and *P. virginiana* var. *demissa*. Transmission of necrotic ring spot virus was accomplished when the inoculating buds were removed 96 hours (but not earlier) after the operation. A component of CR 5–1 was transmitted to two apple seedlings [cf. 33, p. 89].

MILBRATH (J. A.). **The 'Eckelrader' disease or 'Pfeffingerkrankheit' detected in Cherry importations from Europe.**—*Plant Dis. Reptr*, 38, 4, pp. 258–259, 2 figs., 1954. [Multilithed.]

At Oregon State College, Corvallis, in 1949 two separate cherry importations, *Prunus avium* variety Esperen (P.I.127371), originally from France, and *P. cerasus* var. *umbraculifera* (P.I.133841) from the Arnold Arboretum were found when indexed on Bing to be infected by a virus causing symptoms closely resembling those of Pfeffinger disease [cf. *R.A.M.*, 33, p. 304], except that no oil spots [30, p. 50] were observed. All introduced sources of these two varieties at the Plant Introduction Station, Chico, California, and all subsequent propagations from them have since been destroyed. The need for systematized indexing of imported vegetative plant materials before they are released for propagation is emphasized.

HUTCHINSON (M. T.) & VARNEY (E. H.). **Ringspot—a virus disease of cultivated Blueberry.**—*Plant Dis. Reptr*, 38, 4, pp. 260–262, 2 figs., 1 diag., 1954. [Multilithed.]

A graft-transmissible ring spot virus disease of blueberry (*Vaccinium corymbosum*), characterized by small chlorotic dots developing later into red rings and oak-leaf patterns on the leaves, rings on the stems, and occasionally associated with stunt virus symptoms [*R.A.M.*, 31, p. 131], has been observed for several years on Cabot and occasionally on Pioneer in some commercial fields in New Jersey. Spread in the field is rapid. The affected bushes, however, appear to continue to set fruit.

CORNUET (P.). **Les maladies des Fraisiers et la sélection sanitaire.** [Diseases of Strawberries and health selection.]—Reprinted from *Bull. tech. Ing. Serv. agric.* 67, 7 pp., 2 figs., 3 diags., 1952.

After discussing the importance of strawberry-growing in France and the grave lack of health in the plantings the author describes the symptoms, transmission, and a means of detecting the presence of the principal virus diseases [*R.A.M.*, 32, p. 135], the symptoms and control of the principal leaf and root pathogens, and the characteristics of certain mineral deficiencies. He summarizes the principles of production actually envisaged as being under the control of an official control commission for the production of healthy strawberry plants, namely, the choice of a suitable planting site and variety, and a compulsory layout for plantings, method of cultivation, and fungicidal treatments. A system for supplying selected plants test-grafted on *Fragaria vesca* for freedom from viruses is outlined [30, p. 174].

SARASOLA (A. A.). **Nueva enfermedad del Olivo en la Argentina causada por 'Cercospora cladosporioides' Sacc.** [A new disease of Olive in Argentina caused by *Cercospora cladosporioides* Sacc.]—*Rev. Fac. Agron. La Plata*, 28, 1, pp. 41–47, 1 pl., 1951. [English summary.]

Early in 1951 olive trees in the provinces of Buenos Aires and Mendoza, Argentina, were found to be affected by *Cercospora cladosporioides* [*R.A.M.*, 31, pp. 354, 500], a new record for the country. The leaves bore dark, extended, hypophyllous spots and eventually dropped. The twigs were totally or partially defoliated and green fruits [loc. cit.] bore diffuse, round, smooth, later depressed, purple spots at the lenticels.

The fungus appears to be associated consistently with *Alternaria tenuis* [30, p. 174]. However, no biological relationship was discovered.

C. cladosporioides affects the varieties Arauco, Empeltre, Frantoio, Rama Pendola, Piramidalis, Manzanilla, Picudilla, Arbequina, Racimal, Nevadillo Negro, and Leccino, the last-named being particularly susceptible. At present the destruction of fallen fruits and leaves and preventive spraying with Bordeaux mixture are recommended.

Clark (N. G.) & Hams (A. F.). **The fungicidal activity of substituted acetanilides and related compounds.**—*Biochem. J.*, 55, 5, pp. 839–851, 1 pl., 1953.

At the Research Department, Boot's Pure Drug Co., Ltd., Nottingham, the fungicidal activities of 95 non-metallic organic compounds derived structurally from acetanilide were tested. The preparation and physical characters of the 62 new compounds within the group are described. Two biological methods were used, one based on Forsberg's mycelial test [*R.A.M.*, 28, p. 399] and the other on the spore-germination test of the American Phytopathological Society [22, p. 489], incorporating some techniques of Evans and Martin [15, p. 382] and Miller [28, p. 471]. In the first the chemical was used as a 10 per cent. dust in an inert diluent and in the second as an acetone solution at concentrations of 200 p.p.m. or less. The mycelial test was applied to *Pythium debaryanum*, *Corticium solani*, *Botrytis cinerea*, *Fusarium nivale* [*Calonectria nivalis*], *F. caeruleum*, and *Helminthosporium* [*Pyrenophora*] *avenae*, and the spore-germination test to *B. cinerea*, *Sclerotinia fructigena*, and *Alternaria brassicae*.

The compounds exerted general fungicidal activity at a concentration of 10 per cent. but few were effective at 200 p.p.m. Most of the chemicals, particularly in dust or spray form, possess undesirable physiological properties which preclude their practical application.

Memorandum antiparasitaire européen. [Memorandum of European pesticides.]—229 pp., Zürich, Centre International des Antiparasitaires, 1954.

In this brochure (in French) prepared by the International Confederation of Agricultural Technicians in Zürich, about 6,000 plant protection chemicals made in Western Europe are listed (pp. 7–158) in alphabetical order of their trade names, each one followed by its chemical composition, the countries of production, and the manufacturer. A second list (pp. 159–202) gives the names and addresses of the manufacturers and research stations in each country: Germany, England, Austria, Denmark, Belgium, Spain, France, Italy, Norway, Holland, Portugal, Sweden, Switzerland, and Yugoslavia. A supplement to the first list is appended on pp. 206–229, and the chemical equivalents of abbreviations in common use on pp. 203–205.

De Ong (E. R.). **Insect, fungus and weed control.**—400 pp., 37 figs., London, Thames & Hudson Ltd., 1954. 52*s.* 6*d.*

In this manual, originally published by the Chemical Publishing Co., Inc., New York, 1953, the author summarizes the immense developments of the last decade in the application of chemicals as insecticides, fungicides, and herbicides, assembling information previously scattered through numbers of technical journals. The 17 chapters (each followed by a bibliography) include (1) an introduction (pp. 7–14); (2) physical properties of sprays and dusts (pp. 15–26); (3) application equipment (pp. 27–43); (7) inorganic fungicides (pp. 119–134); (8) organic fungicides (pp. 135–147); (9) mineral, vegetable and animal oils (pp. 148–168); (10) fumigants (pp. 169–189); (12) seed disinfectants and protecting agents (pp. 204–225); (14) forest insects and diseases—woody shrubs (pp. 254–274); and (17) industrial insecticides and fungicides (pp. 332–362). An appendix comprises recent reports of successful experiments and a limited number of recommendations for use.

Lowen (E. L.). **Analysis of manganese ethylenebisdithiocarbamate compositions and residues.**—*J. Ass. off. agric. Chem. Wash.*, 36, 2, pp. 484–492, 2 diags., 1953.

A brief summary is given of the modified carbon disulphide evolution procedure used at the Grasselli Chemicals Department, E. I. du Pont de Nemours & Company, Inc., Wilmington, Delaware, for the analysis and assay of manzate [*R.A.M.*, 32,

p. 40] residues on treated crops, followed by a tabulated account of some of the results obtained to date [cf. 33, p. 364]. In general, the levels encountered on crops harvested within one day of the final treatment ranged from 0·05 to 8 p.p.m. and declined progressively thereafter.

Roistacher (C. N.) & Baker (K. F.). **Disinfesting action of wood preservatives on plant containers.**—*Phytopathology*, 44, 2, pp. 65–69, 2 figs., 1954.

For one year after treatment at the Department of Plant Pathology, University of California, Los Angeles, with 2 to 3 per cent. copper naphthenate, nursery flats remained disinfecting and prevented carry-over of damping-off fungi (*Rhizoctonia* [*Corticium*] *solani* and *Pythium* spp.) from contaminated to pasteurized soil.

Root injury developed in California Wonder Bell [chilli] pepper plants in contact with the wood a year after application of the chemical, though the flats had been filled and emptied six times during the period. Flats treated with copper naphthenate and allowed to dry for nine to ten days after dipping caused damage (not due to the diluent) to a wide range of seedlings with the exception of chilli, pea, nasturtium [*Tropaeolum majus*], and *Calendula*. It is concluded that copper naphthenate should not be applied to containers used for seed-sowing, research on root or plant growth, or cultivation of sensitive species. It may be applied with safety, however, to glass-house benches and to flats in which the seedlings are planted 2 to 3 in. from the sides [cf. *R.A.M.*, 33, p. 542]. Flats treated with Wolman salts or erdalith are neither disinfecting nor phytotoxic.

Rosen (W. G.). **Effects of streptomycin on certain green plants.**—*Ohio J. Sci.*, 54, 2, pp. 73–78, 1954.

In experiments in the Department of Botany and Plant Pathology, Ohio State University, Columbus, steeping pea, bean, and maize seeds in 0·12 to 1 per cent. solutions of streptomycin (dihydrostreptomycin sulphate) caused effects in the seedlings varying from leaf chlorosis to stunting of the stems, roots, and leaves [cf. *R.A.M.*, 30, p. 408; 32, p. 270; 33, p. 545]. Steeping one of the primary leaves of a bean seedling, before expansion of the subsequent leaves, resulted in the development of bleaching and toxic symptoms in the first and second trifoliate leaves.

Darpoux (H.). **Les antibiotiques en phytopharmacie.** [Antibiotics in plant protection.]—[*Cah. Ing. agron.* 7, pp. 125–148, ? 1952. Received June, 1954.]

This is a comprehensive survey, based on the literature (107 titles), of the use of antibiotics in plant pathology, the aspects covered being their production and role in the soil, their use in seed disinfection, as sprays to prevent, cure, or eradicate internal parasites, against crown gall (*Agrobacterium* [*Bacterium*] *tumefaciens*), and as internal therapeutants. The paper concludes with brief notes on the physical properties and chemical constitution of the principal antibiotics employed in plant pathology.

Delmotte (P.) & Delmotte-Plaquée (Mme P.). **Étude sur un nouveau produit d'origine fongique doué de propriétés fongistatiques.** [Study on a new product of fungus origin endowed with fungistatic properties.]—*J. Pharm. Belg.*, *1952*, 11–12, pp. 511–515, 1952. [Flemish summary. Received March, 1954.]

This information concerning the antibiotic activity of a substance obtained from a strain of *Monosporium bonorden* isolated from Belgian Congo soil has already been noticed from another source [*R.A.M.*, 32, p. 330].

Schwanitz (F.) & Hahn (H.). **Ein Bakterienstamm mit breitem antibiotischem Spektrum. Ein Bakterienstamm mit fungistatischer Wirksamkeit gegenüber**

phytopathogenen und humanpathogenen Pilzen. Ein weiterer Bakterienstamm (Bacterium 16) mit fungistatischer Wirkung gegen human- und phytopathogenen Pilzarten. [A bacterial strain with a broad antibiotic spectrum. A bacterial strain with fungistatic activity towards phyto- and human-pathogenic fungi. A further bacterial strain (bacterium 16) with a fungistatic effect on human and phytopathogenic fungi.]—*Naturwissenschaften*, 40, 6, p. 202, 6 figs.; 17, p. 464, 4 figs.; 18, p. 489, 3 figs., 1953.

Bacterium '13', isolated from flax at the Max Planck Institute for Breeding Research, Niedermassberg, Westphalia, Germany, exerted a definitely fungistatic effect on carrot agar cultures of *Colletotrichum lini*, *Phoma* sp., *Rhizoctonia* [*Corticium*] *solani*, *Alternaria* sp., *Trichothecium roseum*, *Fusarium* sp., *Penicillium notatum*, and *Polyspora lini*; *Colletotrichum lini* was actually destroyed.

Bacterium '24', which developed as a contaminant in the course of tests with bacterium '13' against dermatophytes, was fungistatic to the same fungi excluding *P. lini*, the degrees of inhibition being estimated at 55, 54, 83·7, 45·4, 43·7, 11·5, and 5·5 per cent., respectively.

Bacterium '16' inhibited the development of *Corticium solani*, *Colletotrichum lini*, *T. roseum*, *A.* sp., and *Phoma* sp. to the extent of 97·1, 93·4, 74·1, 34·7, and 32·3 per cent., respectively.

Boerger (A.). **Genética de la inmunidad vegetal en el Rio de la Plata.** [The genetics of plant immunity in the River Plate region.]—*Arch. fitotéc. Urug.*, 5, 1, pp. 55–93, 1952. [English summary, p. 173.]

This information has already been noticed from another source. An 11-page bibliography is appended [*R.A.M.*, 30, p. 53].

Jinks (J. L.). **Somatic selection in fungi.**—*Nature, Lond.*, 174, 4426, pp. 409–410, 1954.

In studies in the Department of Genetics, University of Birmingham, it was found that following a few transfers of single, consistently uninucleate conidia of *Aspergillus nidulans*, perithecial formation became progressively delayed and infrequent; after the 14th none was produced and the line has remained conidial for over a year. After the fifth and ninth conidial transfers single ascospores were also used for starting new cultures. Ascospore germination was initially poor. After several generations of ascospore transfer, however, germination and perithecial formation improved until the lost characteristics of the normal culture had been regained. A series of transfers by single ascospores made parallel with the conidial transfers led to a marked decrease in conidia [cf. *R.A.M.*, 33, p. 490]. Sub-lines from the third and ninth generations returned to normal. Thus these two lines changed in the direction of the method of propagation used.

Colonies arising from single uninucleate conidia of *Penicillium cyclopium* (homokaryons derived from recently isolated heterokaryons) [32, p. 28] varied in their sporulation, the more fertile arising disproportionately often from spores formed early in the life of the parent mycelium. Transfer by hyphal tips or sterile aerial mycelium appeared to lead to a delay in sporulation if not to an actual decrease in the number of spores. On the other hand, parallel cultures obtained by continuous transfer through single conidia resulted in a gradual increase in the intensity of sporulation. In all tests the changes were reversible.

From mating experiments it is concluded that the differentiation between ascogenous hyphae, conidiophores, and vegetative mycelia in *A. nidulans* is due to the condition of the cytoplasm in the region concerned, since a nucleus originally of a non-sexual type is able to give the full range of development when present in the cytoplasm of the heterokaryon. One difference between fungi and most higher

organisms would appear to lie in the less rigid control of the cytoplasm by the fungus nucleus.

Sackston (W. E.). **A quick method of preparing semipermanent slide mounts of fungi on agar.**—*Phytopathology*, 44, 2, pp. 106–107, 1 fig., 1954.

The following method was devised for the preparation of semi-permanent slide mounts of spores and mycelium *in situ* from agar cultures of *Septoria linicola* [*Mycosphaerella linorum*].

A block of agar cut from a dish is placed on a slide and trimmed to measure about 4 to 6 mm. less in diameter than the cover-slip, which may be applied directly to the block, or a drop of water or lactophenol, with or without stain, added first. A few chips, each about 5 mm. in size, of paraffin embedding material are placed on the slide, resting against the edge of the cover-slip. The slide is held at a slight angle from the horizontal and the wax warmed gently in a flame, so that it spreads under the cover-slip and encircles the agar block.

Spore measurements of *M. linorum* made seven months after slides were prepared by this method in March, 1948, and stored in a drawer were similar to those of fresh material, but by June, 1953, many of the blocks were dry. However, other mounts of *M. linorum* and other fungi were still in good condition after several years.

Rishbeth (J.). **The wet-film Indian ink method for examining micro-organisms.**—*Nature, Lond.*, 174, 4425, pp. 361–362, 1954.

Modifications of the wet-film Indian ink technique (*J. Path. Bact.*, 63, p. 673) are described for the examination of various micro-organisms. With fungi, the mycelium is grown over a glass coverslip or square of 'cellophane', which is mounted in 'Pelican' ink diluted to 1 in 5 or 1 in 10 parts of water. This method is particularly useful for obtaining preparations of delicate fungi, or those distorted by fixing.

Nielsen (J. P.), Benedict (H. M.), & Holloman (A. J.). **Fluorescence as a means of identifying smog markings on plants.**—*Science*, 120, 3109, pp. 182–183, 1954.

At the Stanford Research Institute, California, the markings caused by 'smog' on leaves of a wide variety of plants from the Los Angeles area [*R.A.M.*, 33, p. 548] fluoresced a distinctive pale blue when exposed to ultra-violet radiation from a mercury vapour lamp. This method, subject to confirmatory studies, may provide the first means of assessing 'smog' damage to vegetation as distinct from that caused by pests and nutritional disorders.

Long (L. M.) & Troutman (H. D.). **Chloromycetin. Synthesis of α-dichloroacetamido-β-hydroxy-*p*-nitropropiophenone.**—*J. Amer. chem. Soc.*, 73, 1, pp. 481–482, 1951.

At the Research Laboratories of Parke, Davis & Co., Detroit, Michigan, the racemate of a dehydro derivative of chloramphenicol, obtained by the substitution of a dichloroacetyl group for the acetyl in α-acetamido-β-hydroxy-*p*-nitropropiophenone [cf. next abstract], exerted a remarkable measure of fungicidal potency, a dilution of 1:487,805 (2·05 γ per ml.), for instance, causing 50 per cent. inhibition in the growth of *Candida albicans*.

Rebstock (Mildred C.) & Pfeiffer (Elizabeth L.). **Chloromycetin. The synthesis of *p*-phenoxy and *p*-methoxy compounds.**—*J. Amer. chem. Soc.*, 74, 13, pp. 3207–3210, 1952.

In further studies on the synthesis of compounds in which various groups were substituted for nitro in the aromatic nucleus of chloramphenicol [see preceding

abstract], the authors report the synthesis of *p*-methoxy- and *p*-methoxy substituted propiophenones which are similar to one reported by Long and Troutman [loc. cit.] to be an effective fungicide.

Bennett Clark (J.). **A 'black yeast' as a cause of mildew.**—*Proc. Okla Acad. Sci.*, 33 (*1952*), pp. 142–143, 1954.

A 'black yeast' [cf. *R.A.M.*, 26, p. 308], closely resembling that described by Will (Guilliermond, A. The Yeasts. 1920) as Form III of *Torula nigra*, was isolated from an oil base titanium paint on the interior walls of a house less than six months old in the Gulf Coast area of Texas. The mildew appeared as small black spots which spread into patches 2 to 3 in. in diameter. On Sabouraud's agar the small, cream-coloured colonies turned jet black after five days. The cells (3·5 by 9 μ) were mostly ellipsoidal, but sometimes spherical. With age the colony appeared granular and the dark green mycelial phase was evident in six days. Ascospores were present.

Levisohn (Ida). **Test for the pseudomycorrhizal group of soil fungi.**—*Nature, Lond.*, 174, 4426, pp. 408–409, 1 fig., 1954.

At Bedford College, London, *Rhizoctonia* sp. and *Mycelium radicis atrovirens*, the most common causes of pseudomycorrhizal infection in Great Britain [*R.A.M.*, 33, pp. 493–494], grew well on cones of filter paper, cotton wool, and similar cellulose materials constantly moistened by nutrient solution. After three to four weeks' growth the fibres were invaded by the mycelium at points where lesions occurred; large black sclerotia were sometimes formed, producing dark, swollen areas in the lumen. Hyphae not producing sclerotia formed numerous irregular fusions, giving rise to a well-defined but unswollen structure closely resembling that of an intercellular net present in pseudomycorrhizal associations of living root tissues. The 'net' infection appeared to depend mainly on the constitution of the nutrients supplied and the rate of liquid absorption by the cellulose material. Beer wort proved a most suitable medium but not potato dextrose. Although *Alternaria*, *Stemphylium*, *Pullularia*, and *Chaetomium* grew vigorously on the surface of the cones, none produced a net structure within the fibres. Nor was net formation recorded for true mycorrhiza-formers grown under these conditions.

Diercks (R.). **Der Einfluss der Mineralsalzernährung auf Wanderungs- und Aufbreitungsgeschwindigkeit des X-Virus in der Kartoffelpflanze.** [The influence of mineral salt nutrition on the rapidity of movement and spread of the X-virus in the Potato plant.]—*Z. PflBau*, 4 (48), 6, pp. 252–288, 5 figs., 1953.

From the results of experiments at the Institute for Agriculture, Weihenstephan, Bavaria, the following conclusions (based on determinations by both serological and symptomatological methods) were reached regarding the effect of mineral fertilizers on the movement of potato virus X [cf. *R.A.M.*, 33, p. 441] in Ackersegen plants inoculated by rubbing the carborundum-abraded leaves with infective sap. In both first-year and succeeding crops excess of nitrogen and chloride in soil amendments strongly accelerated the movement of the virus, while nitrogen shortage delayed it; at the age of ten weeks plants in the low-nitrogen group reacted negatively to inoculation [32, p. 143]. Some leaves of the inoculated plants remained free from infection [16, p. 704; 25, p. 322]. In young potato plants the virus spreads upwards and downwards at an equal rate.

The most important practical application of the foregoing experimental data is the total exclusion of chlorides from the fertilizer schedule both for 'seed' and general potato cultivation. Seed potatoes should be given only moderate supplies of nitrogen, but for the crop as a whole an excess, notwithstanding its tendency to

increase infection [cf. 32, p. 691], is probably less detrimental than a deficiency, with its very adverse effects on yield.

Merriam (D.) & Bonde (R.). **Dissemination of spindle tuber by contaminated tractor wheels and by foliage contact with diseased Potato plants.**—Abs. in *Phytopathology*, 44, 2, p. 111, 1954.

The results of studies to determine the reasons for the recent increase of potato spindle tuber virus in Maine [*R.A.M.*, 30, p. 577] showed that transmission is readily effected by brushing healthy plants with diseased foliage, from 80 to 100 per cent. of those inoculated by this method contracting infection, or by driving contaminated tractor wheels over the leaves of healthy plants. In one test the spread of disease was 13 per cent. for the Kennebec variety, 6 per cent. for Green Mountain, and 4 per cent. for Katahdin and Cobbler. Tractor-drawn machinery is now almost universally used in the State and is thought to be of potential importance in the spread of the virus, which is very difficult to detect in the large-leaved plants of Kennebec.

Rich (A. E.), Bilbruck (J. D.), & Toko (H. V.). **An effective method for field screening of promising fungicides for the control of Potato late blight.**—Abs. in *Phytopathology*, 44, 2, p. 112, 1954.

The following method for small-scale field evaluation of fungicides was devised [at New Hampshire Agricultural Experiment Station, Durham], using *Phytophthora infestans* as a test organism. Potatoes were planted in 'hills' 6 ft. apart each way, with four whole tubers per hill. Each hill constituted a plot and the treatments (made with a knapsack sprayer) were replicated four times. Shade was provided during part of the day by some neighbouring trees, between which and the plots a border of potatoes was planted and inoculated with the fungus. Infected plants dragged through the plots on rainy mornings caused satisfactory infection despite a hot, dry season. A close correlation was established between disease control and yields.

Chernuishova (Mme O. P.). О мерах борьбы с фитофторой. [On measures for the control of *Phytophthora*.]—Сад и Огород [*Orchard & Garden*], *1954*, 4, pp. 35–37, 1954.

Recommendations for the control of potato blight (*Phytophthora infestans*) in the U.S.S.R. [*R.A.M.*, 33, p. 310] include choice of healthy planting material, regular and correct rotation, tuber vernalization [cf. 32, p. 692], early sowing, square planting, spraying with Bordeaux mixture (600 to 800 l. per ha.) or with copper chloride, cutting down of infected foliage five to seven days before harvest, and immediate drying of the tubers.

Pristou (R.) & Gallegly (M. E.). **Leaf penetration by Phytophthora infestans.**—*Phytopathology*, 44, 2, pp. 81–86, 3 figs., 1954.

Histological studies at West Virginia Agricultural Experiment Station, Morgantown, of leaf penetration of the susceptible Cobbler and the resistant Kennebec potato varieties and of Wisconsin '55' tomato by potato race A of *Phytophthora infestans* [cf. *R.A.M.*, 31, p. 349; 33, p. 375] demonstrated that when the encysted zoospore germinated it produced an appressorium and an infection peg, through which the protoplasm flowed to form a primary mycelium in the epidermal cell; the tissue of Cobbler leaves was permeated by finger-like secondary intercellular mycelium. Encysted zoospores also formed appressoria in Petri dishes containing a little water.

Penetration was effected two hours after inoculation with motile zoospores on both resistant and susceptible hosts [cf. 29, p. 638]. Penetration was usually directly through the epidermis, though occasionally through the stomata. In the resistant Kennebec the mycelium was never detected beyond the cell originally penetrated. Disintegration of the primary mycelium and death of the cells surrounding the site of invasion occurred between 48 and 72 hours after inoculation.

Although mechanical pressure was shown to be exerted by the fungus, some substance which had a high affinity for safranin stain was acting in advance of the invading hyphae.

Penetration by germ-tubes from sporangia was not observed [cf. next abstract], though long ones were found growing on the leaf surfaces.

Ferris (Virginia R.) & Kent (G. C.). **Penetration and infection following direct germination of the sporangia of Phytophthora infestans.**—Abs. in *Phytopathology*, 44, 2, p. 110, 1954.

Doubt has hitherto prevailed as to the ability of the germ-tubes produced directly by the sporangia of *Phytophthora infestans* to penetrate the potato plant and initiate infection [see preceding abstract], but the results of recent studies [at Cornell University: *R.A.M.*, 33, p. 375] on both fresh and fixed material indicate that this does in fact occur.

Vladimirskaya (Mme N. N.). К вопросу о борьбе с раком Картофеля. [On the question of Potato wart control.]—Сад и Огород [*Orchard & Garden*], *1954*, 4, p. 38, 1954.

In experiments carried out in the U.S.S.R. the viability of potato wart [*Synchytrium endobioticum*: *R.A.M.*, 33, p. 173] sporangia in the soil was reduced during the period from 1948 to 1952, inclusive, by 99·4 per cent. in pots kept above ground and by 97·6 per cent. in pots buried in the ground. Field experiments indicated that high soil humidity stimulates germination of the sporangia and accelerates the process of freeing the soil from the fungus; thus, after one year 22 to 29 per cent. of the sporangia remained viable at humidities between 100 and 40 per cent. compared with 38 to 43 per cent. at the 30 to 20 per cent. levels.

Growing potatoes in rotation with vegetables which provide maximum soil humidity might be a means of controlling the disease.

Schutt (K.). **Beitrag zur Chemie der Kartoffel-Welkekrankheit.** [Contribution to the chemistry of the Potato wilt disease.]—*Bodenkultur*, 7, 3, pp. 268–278, 1 fig., 1953. [Received September, 1954.]

The analysis at the Agricultural-Chemical Federal Experiment Station, Vienna, of aqueous soil extracts from the rhizosphere of field plants of Allerfrüheste Gelbe, Sieglinde, and an unknown potato variety affected by wilt (*Colletotrichum* [*atramentarium*: *R.A.M.*, 33, p. 314]) revealed up to double the normal dry weight and quantities of inorganic salts. The amounts of calcium, magnesium, and sulphate ions in extracts from wilt soils were larger than those from comparable non-infested samples, and the specific conductivity of the extracts was greater by 15 to 50 per cent. The ash of wilt-diseased plants contained more potassium and chlorine and less calcium, magnesium, and sulphate than healthy material. These differences appear to be conditioned by the wilting or by the disturbance in growth associated with persistent drought. The high potassium content of the diseased plants does not support the view that a deficiency of this element is concerned in the wilt, which is considered to result from increased osmotic pressure of the soil solution, due in its turn to the augmented ionic content, drought, and excess of calcium, magnesium, and sulphate ions. The wilting plants absorb water from the tubers as

long as the stolon remains intact. The tubers shrivel and soften and the plants become highly susceptible and eventually succumb to salt injury.

It follows from these observations that applications of calcium to the calcareous soils of Upper Austria are not only superfluous but definitely harmful and should be avoided.

A simple and expeditious method for the differentiation of wilt-infested and normal soils is based on the rapid sedimentation of soil extracts enriched with electrolytes. The supernatant fluid of the latter becomes almost clear at once whereas that of the former remains turbid.

Baba (I.), Takahashi (Y.), Iwata (I.), & Inada (K.). **Studies on the nutrition of the Rice plant in relation to the occurrence of the so-called 'Akagare' disease I. Occurrence of the disease as influenced by the temperature of the irrigation water and by the supply of potassium or starch to the soil.**—*Proc. Crop Sci. Soc. Japan*, 22, 3–4, pp. 111–112, 13 graphs, 1954. [Japanese, with English summary.]

Experiments in which rice was grown under various environmental conditions in a field in which 'Akagare' disease habitually occurred demonstrated that incidence was increased by depletion of potassium, by supplying starch to the soil, and exposing the plants to warm irrigation water (36° to 39° C.) without potassium. It appeared to be correlated primarily with the lowering of the potassium–nitrogen ratio in the leaf blade [*R.A.M.*, 31, p. 141].

McElroy (Celia), Jones (W. H.), & Rinehart (F. A.). **An investigation of the soil microflora of two grassland plots.**—*Proc. Okla Acad. Sci.*, 33 (*1952*), pp. 163–168, 2 graphs, 1954.

In July, 1952, studies were made of two plots, $\frac{1}{4}$ mile apart, situated eight miles south-west of Norman, Oklahoma. One, covering five acres of virgin prairie, contained tall grass, including *Andropogon scoparius*, *A. furcatus*, *Aster ericoides*, *Panicum virgatum*, and *Sorghastrum nutans*; the other, a revegetating, abandoned field uncultivated for 11 years, had as its dominant species *Aristida oligantha*, *Lespedeza stipulacea* (planted), and *P. scribnerianum*. Both were burned over six months prior to the investigation.

The total activity of micro-organisms, as measured by the rate of respiration, and numbers of actinomycetes were much greater in the field, while the total organisms per gm. and the bacteria were significantly more numerous in the prairie. The numbers of fungi were nearly the same in the two plots. Of the 42 species identified, 36·2 per cent. were common to both plots, the principal ones (found on 30 per cent. or more of the plates) being *Fusarium decemcellulare*, *Fusarium* (section *Martiella*), and *F. neoceras*. *Mucor sphaerosporus*, *Penicillium notatum*, and *Trichoderma lignorum* [*T. viride*] were more numerous (on over 30 per cent. of the plates) in the prairie soil and *F. moniliforme* [*Gibberella fujikuroi*: *R.A.M.*, 33, p. 626], *F. nivale* [*Calonectria nivalis*], *M. globosus*, and *P. fellutanum* in the field. Species occurring in the former only (on 10 per cent. or more of the plates) were *Botrytis terrestris*, *F. orthoceras*, *P. biforme*, and *Sporotrichum pruinosum* and in the latter only, *F. lateritium* [*G. baccata*], *Phycomyces nitens*, *Torula allii*, and *Trichosporium nigricans*.

Zogg (H.). **Probleme der biologischen Bodenentseuchung.** [Problems of biological soil decontamination.]—Reprinted from *Schweiz. landw. Mh.*, 31, 9–10, 15 pp., 8 graphs, 1953.

Most of the 47 contributions to the subject cited in the author's survey of problems connected with the control of soil-borne fungus diseases by systematic crop rotation have been noticed from time to time in this *Review*.

Beckmann (T. J.). **Zinc in plants and soil.**—*Qd agric. J.*, 79, 1, pp. 24–25, 1954.

The symptoms and control of zinc deficiency in fruit, including citrus [*R.A.M.*, 24, p. 16], vegetable, and cereal crops, are briefly outlined, as this disorder is of frequent occurrence along the coastal belt and on the southern highlands of Queensland. Soil applications of between 7 to 14 lb. zinc sulphate per acre are the most suitable treatment for field crops. For deciduous fruits [28, p. 338] a spray (50 lb. in 100 gals. water) is applied yearly during the winter.

List 22.—*Agric. Lit. Boron, 1953*, April–June, pp. 11–16, 1953. [Mimeographed.]

This list contains, *inter alia*, an abstract of a paper by C. González and C. Camacho (*Tech. Bull. Minist. Agric. Costa Rica* 11, p. 52) describing the symptoms of boron deficiency [cf. *R.A.M.*, 33, p. 536] in coffee bushes in Costa Rica. Affected trees show abnormalities in the form, texture, and coloration of the leaves, the formation of cork-like growth over some of the veins in the older foliage, and a fan-like growth of new leaflets at the tips of the stems. Sour orange trees growing in the same area also show boron deficiency symptoms.

Luck (J. V.). **Studies on the Verticillium wilt of Mentha piperita L., with special emphasis on the causal organism, Verticillium albo-atrum R. & B.**—*Diss. Abstr.*, 14, 6, pp. 916–917, 1954.

Studies at Purdue University [Indiana] disclosed that the microsclerotia of *Verticillium albo-atrum*, the agent of peppermint (*Mentha piperita*) wilt [*R.A.M.*, 32, p. 399], can persist in muck soils under field conditions for at least four years in the absence of known susceptible hosts, but the spores and mycelium did not survive for more than five months under these conditions. The need for standard rooting procedures and proper temperature controls in indexing the inoculum potential of a soil was demonstrated. Within limits, the time required for infection to take place was found to be a function of the root development of the host.

Loh (C. S.). **P.T. 43–52, a typhoon and rain-resisting Sugar Cane variety.**—*News Lett. Taiwan Sug. Corp.*, May, 1953. [Abs. in *Sugar, N.Y.*, 48, 9, p. 67, 1953.]

The PT 43–52 sugar-cane variety [*R.A.M.*, 31, p. 300] is stated not only to withstand the effects of typhoon and excessive rainfall in Formosa but also to be resistant to red rot [*Physalospora tucumanensis*: but see 30, p. 543]. It is, however, susceptible to downy mildew [*Sclerospora sacchari*].

Mattos Sierra (R. A.). **El 'carbón' de la Caña de Azúcar en la provincia de Corrientes.** [Smut of Sugar Cane in the Province of Corrientes.]—*Arch fitotéc. Urug.*, 5, 1, pp. 3–5, 1 fig., 1 map, 1952. [English summary, p. 171.]

Evidence is presented of the occurrence of sugar-cane smut (*Ustilago scitaminea*) in the San Cosme department, Corrientes, Argentina [*R.A.M.*, 30, p. 193], during 1946 and 1947 on the varieties POJ 213, POJ 36, Tuc. 1111, Tuc. 1149, Tuc. 379, Co. 289, Tuc. 1406, Tuc. 2683, Tuc. 2680, and Tuc. 2701.

Karling (J. S.). **Possible relationships and phylogeny of Synchytrium.**—*Bull. Torrey bot. Cl.*, 81, 4, pp. 353–362, 1 diag., 1954.

The author speculates on the possible phylogenetic relationships between the genera *Synchytrium* [*R.A.M.*, 33, p. 118], *Micromycopsis*, and *Endodesmidium*.

Brown (J. G.). **A new species of Hysterographium.**—*Mycologia*, 45, 6, pp. 964–967, 2 figs., 1953.

A full technical description is given of *Hysterographium opuntiae* n.sp., a saprophytic, wood-destroying fungus found near Tucson, southern Arizona, as a fairly

common inhabitant of the surface of decorticated trunks and branches of the cholla cactus, *Opuntia fulgida*.

The cryptogamic flora of the Arctic VI. Fungi.—*Bot. Rev.*, 20, 6–7, pp. 451–462, 1954.

In the section on Arctic fungi of this symposium R. Singer discusses from the literature (16 titles) and some unpublished work of his own the groups represented and their significance [*R.A.M.*, 33, p. 41], geographical distribution, and practical importance in mycorrhizal associations, as food sources for animals and man, and as agents of plant diseases and of the deterioration of timber and fabric.

Lindquist (J. C.). **Uredinales de la provincia de Mendoza.** [Uredinales of Mendoza Province.]—*Rev. Fac. Agron. La Plata*, 28, 1, pp. 65–114, 2 figs., 1951. [English summary.]

This annotated list of 80 Uredinales occurring in the province of Mendoza, Argentina, includes three new species and *Puccinia graminis* [*R.A.M.*, 32, p. 73] on *Avena* sp., *Lolium multiflorum*, *Erianthus* sp., *Poa* sp., *P. holciformis*, and wheat; *Uromyces caryophyllinus* [*U. dianthi*: cf. 30, p. 194] on carnation; *Phragmidium mucronatum* on rose [3, p. 261]; *Tranzschelia* [*Puccinia*] *pruni-spinosae* [C.M.I. map No. 223] on peach; *Uromyces fabae* on broad bean [No. 200]; and *U. striatus* on lucerne [*R.A.M.*, 30, p. 615] and *Medicago lupulina* and its var. *umbelloides*.

Batista (A. C.). **Outras espécies de Phyllosticta recolhidas em Pernambuco.** [Further species of *Phyllosticta* collected in Pernambuco.]—*An. Congr. Soc. bot. Brasil, 1953*, pp. 84–88, 1953.

Six of the seven species of *Phyllosticta* in this further contribution to the knowledge of the genus in Brazil [*R.A.M.*, 33, p. 117] are new. *P. coix-lacrimae* n.sp. produces pale chestnut-coloured, dark-edged lesions of indefinite length and 10 mm. in width on both sides of the leaves of *Coix lacryma-jobi*. Its black, lenticular pycnidia measure 16 to 24 μ in diameter and the conidia 3·6 by 2 to 2·5 μ.

P. mangifericola n.sp. is the agent of ash grey spots with rust-coloured margins, up to 10 mm. in diameter, on both sides of mango leaves. The black pycnidia measure 130 to 200 μ in diameter, and the fusoid conidia 6 to 9 by 2 to 2·5 μ. Conidiophores were not observed in either species.

P. oxalidis produces on the margins of both leaf surfaces of *Averrhoa carambola* whitish, dark chestnut-bordered, irregular lesions. The globose to applanate, fuscous, subepidermal pycnidia measure 3 to 9·5 μ in diameter, and the globose to ovoid or elliptical conidia 4 to 6 by 2 to 3 μ.

The amphigenous, whitish spots with darker borders formed on the leaves of *Syzygium jambolanum* [*Eugenia cumini*] by *P. sizygii* n.sp. gradually extend over the entire surface and later disintegrate. The globose to depressed, fuscous to black, immersed to erumpent pycnidia, 120 to 210 μ in diameter, are provided with an ostiole 9·5 to 15 μ wide; the fusoid, biguttulate conidia measure 5 to 8 by 2 to 2·5 μ. *P. zeae* n.sp., producing in association with *Phaeomarssonina* sp. and *Robillardia* sp. ellipsoid or irregular, amphigenous, whitish, chestnut-bordered spots, up to 20 mm. in diameter, on maize leaves, has globose to depressed, subepidermal, black pycnidia, 65 to 120 μ in diameter, with a well-marked ostiole, 10 to 15 μ wide, and cylindrical conidia, 5 to 8 by 2 to 2·5 μ.

Drechsler (C.). **Aphanomyces euteiches from Pea roots and 'Aphanomyces euteiches P.F.2.'**—*J. Wash. Acad. Sci.*, 44, 8, pp. 236–244, 4 figs., 1954.

At the Plant Industry Station, Beltsville, Maryland, a cultural examination of the isolate from pansies (*Viola tricolor* var. *hortensis*) in Holland designated *Aphanomyces 'euteiches* P.F.2' [*R.A.M.*, 8, p. 187] revealed that it differed from isolates of

A. euteiches from peas [31, p. 256] in the greater complexity of the hyphal connexions of the sexual organs and in the relative thinness of the oogonial wall. It resembled more closely isolates of *A. cladogamus* [see next abstract]. A study of additional pansy isolates from Holland is needed before the identity of *A. 'euteiches* P.F.2' can be definitely established.

Drechsler (C.). **Morphological features shown in Aphanomyces isolations from roots of Spinach and Flax.**—*J. Wash. Acad. Sci.*, 44, 7, pp. 212–219, 4 figs., 1954.

Detailed morphological studies of isolates from the discoloured roots of flax and spinach made at the Plant Industry Station, Beltsville, Maryland, showed that they agreed satisfactorily with *Aphanomyces cladogamus* [*R.A.M.*, 32, p. 360 and preceding abstract].

Nichols (C. W.). **Absorption of thiouracil by Tobacco leaf tissue and inhibition of Tobacco mosaic virus multiplication.**—*Phytopathology*, 44, 2, pp. 92–93, 3 graphs, 1954.

At the Department of Plant Pathology, University of California, Berkeley, the author determined the amount of thiouracil absorbed in 24-hour periods by tobacco leaf disks inoculated with tobacco mosaic virus and floated on aqueous solutions of the chemical at concentrations ranging from 1 to 100 mg. per l., and the quantity of virus present in the material at the end of six days [*R.A.M.*, 33, pp. 387, 585]. The rate of absorption, about 50 per cent. slower during the second 24-hour period than the first at all concentrations, was followed by a rise to slightly less than the original rate in the third and succeeding periods. A tenfold increase in thiouracil concentration usually produced a sixfold increase in the amount of chemical absorbed by 16 disks floated on 10-ml. samples of the solutions for 24 hours.

The minimum quantity of absorbed thiouracil causing virtually complete inhibition of virus multiplication was 0·013 mg. per 24 hours. The maximum increase of inhibition was obtained with an increase in the amount of thiouracil absorbed per 24 hours from 0·003 to 0·01 mg. The inhibition of virus multiplication bore no factorial relation to either the concentration of the available chemical or the amount of it absorbed.

Weathers (L. G.) & Pound (G. S.). **Host nutrition in relation to multiplication of Tobacco mosaic virus in Tobacco.**—*Phytopathology*, 44, 2, pp. 74–80, 1 fig., 1954.

At the Department of Plant Pathology, University of Wisconsin, an investigation was made of the relation of nitrogen, phosphorus, and potassium contents, and the concentration of balanced nutrient solutions to host growth and multiplication of tobacco mosaic virus in Connecticut Havana No. 38 tobacco [cf. *R.A.M.*, 33, pp. 387, 515]. Virus concentration was measured by local lesion inoculation with sap from systemically infected tip leaves to the F_1 hybrid of tobacco × *Nicotiana glutinosa* and by ultra-violet absorption (optical density) of purified virus suspensions [30, p. 391].

At nitrogen levels ranging from 21 to 1,050 p.p.m. the virus concentration was inversely correlated with the increase of nitrogen [cf. 21, pp. 169, 392]. On the other hand, with purified virus preparations taken from entire plants the maximum concentration was found to be directly correlated with the amount of nitrogen supplied to the host. This discrepancy was traced to the fact that an increase in nitrogen simultaneously raised the concentration of an inhibitor in the plants, which depressed the virus activity of the sap [cf. 32, p. 165; 33, p. 640].

The growth gradient of the plants increased at phosphorus levels between 3 and 237 p.p.m., above which it declined. The stunting was not accompanied, however,

by a decrease in virus concentration, the values of which at 547 p.p.m. equalled or exceeded those recorded at 237 p.p.m.

With balanced solutions a close correlation was established between host growth and virus concentration, the highest lesion counts and optical density readings being at the 1H [Hoagland: 32, p. 297] level, coinciding with maximum growth.

Variations in the potassium supply exerted little effect either on host growth or virus concentration.

LEBEN (C.). **Influence of acidic buffer sprays on infection of Tomato leaves by Alternaria solani.**—*Phytopathology*, 44, 2, pp. 101–106, 1954.

In greenhouse inoculation tests with *Alternaria solani* on Bonny Best tomato foliage at the Department of Plant Pathology, University of Wisconsin, acidic buffers of sodium or potassium phosphate or of sulphuric acid plus sodium sulphate, applied as protectant sprays, gave 53 to 79 per cent. early blight control. In *in vitro* tests a number of other pathogens besides *A. solani* proved to be sensitive to acidity, including *Cladosporium cucumerinum*, *Colletotrichum circinans*, *C. lagenarium*, *Endoconidiophora fagacearum* [*Chalara quercina*], *Stemphylium sarciniforme*, *Venturia inaequalis*, and *Verticillium albo-atrum*, none of which made more than a trace of growth at pH 3·2. It is suggested that more attention should be paid to pH and buffering capacity in the assessment of toxicants [cf. *R.A.M.*, 31, p. 620].

SCHEFFER (R. P.) & WALKER (J. C.). **Distribution and nature of Fusarium resistance in the Tomato plant.**—*Phytopathology*, 44, 2, pp. 94–101, 1 fig., 1 graph, 1954.

At the Department of Plant Pathology, University of Wisconsin, tomato cuttings of the susceptible Bonny Best, Indiana Baltimore, and Stokesdale varieties were inoculated with *Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici* [*R.A.M.*, 33, pp. 122, 644] by placing the cut ends in bud-cell suspensions and allowing them to absorb the requisite dose. Typical symptoms, including wilt, vascular browning, and leaf epinasty, developed in 10 to 15 days, and isolations immediately after inoculation and at subsequent intervals until the plants collapsed revealed the fungus throughout the stems, but not in new roots produced by the infected stems. Inoculated plants of the varieties carrying type A resistance, namely Jefferson, Pan America, and Southland, and two selections of the same genetic constitution, 5–S–46M and 6–S–60M, showed mild symptoms but always recovered, the fungus gradually disappearing from the upper stems under favourable growth conditions for the host. Histological evidence supported the conclusion that resistance was present in the stems as well as in the roots [cf. 32, p. 399]. In plants with type B resistance, represented by Marglobe, Michigan State Forcing, Rutgers, and Pritchard, the disease indices were somewhat lower than in those of the susceptible varieties [cf. 26, p. 473].

No pathological effects were produced by the inoculation of Bonny Best cuttings with *F. oxysporum* from rotted brome [*Bromus*] roots, *F. o.* f. *conglutinans* [*F. conglutinans*], or *F. o.* f. [var.] *nicotianae*; the two first-named survived for up to 35 days in the stem bases but tended to disappear rather sooner from the upper parts than did *F. b.* var. *lycopersici* in type A-resistant plants.

Inoculated Jefferson cuttings allowed to take up dilute ethanol solutions developed characteristic wilt symptoms, whereas the same treatment of uninoculated material exerted no perceptible influence. The possibility that resistance is controlled by continuous metabolic reactions is discussed.

VARMA (R. P.). **Soil conditions and root diseases X. The tomato wilt fusaria.**—*J. Indian bot. Soc.*, 33, 1–2, pp. 43–72, 3 figs., 5 graphs, 1954.

In further work in this series [cf. *R.A.M.*, 33, p. 626] at the University Botany

Laboratory, Madras, 37 isolates of *Fusarium*, selected from over 1,000 isolations made from wilted tomato plants in various parts of the Presidency, were compared in culture with *F. bulbigenum* var. *lycopersici* obtained from the Centraalbureau voor Schimmelcultures, Baarn. This species was not found among the isolates studied. In greenhouse soil inoculation tests with Bonny Best tomato seed and a soil-oats inoculum, all the isolates caused pre-emergence disease, isolates 21 (*F. scirpi*) and 31 (*F. conglutinans* var. *citrinum*) being the most virulent, killing 90 per cent., and isolate 6 (also *F. scirpi*) the least (22 per cent.). At the post-emergence phase isolate 37 (*F. lateritium* var. *uncinatum*) [cf. 28, p. 246] was the most virulent (70 per cent.), followed by 38 (*F. scirpi*), 16 and 2 (*F. solani* var. *minus*), 1 (*F. bulbigenum* var. *lycopersici*), and 10 (*F.s.* var. *martii*), all with 50 per cent. or more; 12 isolates, including No. 21, caused no post-emergence symptoms. The degree of pathogenicity appeared to depend on the period of incubation in the soil before the seeds were sown; a period of 21 to 28 days resulted in a small wilt percentage, but when the seeds and inoculum were inserted on the same day the percentage was much higher. In mixed inoculations of isolate 37 with certain other *Fusarium* isolates the wilt percentage varied and no accurate prediction of virulence could be made on the basis of the pathogenicity of the individual isolates. *F. lateritium* var. *uncinatum* was found only in certain localities, but *F. scirpi* and *F. solani* vars. *minus* and *martii* were found on the roots of diseased plants from all localities. None of the varieties tested showed any marked resistance to *F. lateritium* var. *uncinatum*. Infection generally took place at the point of emergence of the rootlets. No *Fusarium* was isolated from tomato seed obtained from commercial firms, and only a negligible percentage from the seed of wilted plants.

Green (R. J.). **An investigation of the wilting phenomenon in Verticillium wilt of Tomato Lycopersicum esculentum Mill.**—*Diss. Abstr.*, 14, 6, pp. 915–916, 1954.

Of three fractions produced *in vitro* by *Verticillium albo-atrum* isolated from tomato at Purdue University [Indiana], only a protein fraction was of primary significance in the production of wilt symptoms in susceptible plants. Acropetal chlorosis and necrosis, rather than wilting, were found to be the primary symptoms and they proceed independently of the wilt reaction. Environmental conditions, particularly temperature, were also significant. Exhaustive studies revealed that the pathogen may occur throughout the plant system within only six days of inoculation, usually in advance of all but the earliest symptoms. The wilting phenomenon was demonstrated conclusively to be the direct result of the invasion of the host tissues by the pathogen and not induced by a translocated toxin produced either by the fungus or as a result of the host–parasite association.

Dye (D. W.). **Differential effect of therapeutants on bacterial-canker of Tomato (Corynebacterium michiganense (Erw. Smith) Jensen) and on late-blight (Phytophthora infestans (Mont.) de Bary).**—*N.Z. J. Sci. Tech.*, Sect. A, 35, 5, pp. 462–464, 1954.

During the 1952–3 season further trials were carried out at the Plant Diseases Division, Auckland, New Zealand, to confirm previous findings on the control of tomato bacterial canker (*Corynebacterium michiganense*) [cf. *R.A.M.*, 32, p. 595] and blight (*Phytophthora infestans*) [28, p. 37] on the variety South Australian Dwarf. Under conditions favourable to severe blight development on the untreated plots only phygon XL (1 lb. per 100 gals.) of the four fungicides tested was effective against both diseases, reducing the percentage of canker on the harvested fruit from 35 (unsprayed) to 11·5, and blight from 54 to 1. Blight was reduced to the same level by 6–8–100 Bordeaux mixture and the 2–4–100 concentration was almost as effective, but the two levels increased canker infection to 73·3 and 63·6

per cent., respectively. Thirospray (4 lb.) also reduced blight (7 per cent.) but had little effect on canker (31·2).

Buckland (D. C.), Molnar (A. C.), & Wallis (G. W.). **Yellow laminated root rot of Douglas Fir.**—*Canad. J. Bot.*, 32, 1, pp. 69–81, 3 pl., 1 map, 1954.

Yellow laminated root rot, herein ascribed to a *Poria* which may be a variety of *P. weirii* [*R.A.M.*, 33, p. 565] or a distinct species, occurs throughout the Douglas fir (*Pseudotsuga taxifolia*) [29, p. 188] range in British Columbia. The fungus grows from infected to healthy roots through physiologically weakened points of contact or fusion. The disease is most prevalent in Douglas fir because of the common occurrence of root fusion in this species. The trees become susceptible at six years of age, though individuals show marked differences in their resistance to mortality. The symptom picture varies greatly in infected trees and is directly correlated with the resistance of the individual. Inoculum may remain viable for over 50 years in stumps and roots. The fungus does not appear to spread through the soil, or to penetrate healthy bark tissue. Losses are severe where the disease is prevalent in immature stands, which may produce no increase in volume from 30 to 40 years of age until the end of the rotation.

The most practicable, though drastic, method of control appears to be by clear-cutting and severe burning of the site after harvesting. Removal of individual infected trees may be feasible if the fungus in residual roots and stumps can be killed with poison or a herbicide. Control is currently important in many localized areas and may become more so with increased management of second growth Douglas fir forests.

Campana (R. J.). **Corticium galactinum does not cause White Pine needle blight.**—*Plant Dis. Reptr*, 38, 4, pp. 297–303, 1 fig., 1954. [Multilithed.]

Greenhouse inoculation experiments carried out by the Division of Forest Disease Research, New Haven, Connecticut, yielded no evidence that needle blight of white pine (*Pinus strobus*) [*R.A.M.*, 28, p. 259] is caused by *Corticium galactinum* [cf. 31, p. 524; 32, p. 652], despite the reported association of the fungus with diseased trees (*Sci. Tree Top.*, 1, pp. 66–68, 1948).

Yount (W. L.). **Identification of Oak wilt isolates as related to kind of inoculum and pattern of disease spread.**—*Plant Dis. Reptr*, 38, 4, pp. 293–296, 1954. [Multilithed.]

Of 79 isolates of *Endoconidiophora fagacearum* [*Chalara quercina*: see following abstracts] from 54 oak-wilt areas of Pennsylvania, 35 were of the A compatibility type, 32 were B, and 12 mixed A and B [cf. *R.A.M.*, 33, p. 454]. Both strains were found in every county where more than one isolate was identified and in 16 of 19 infection areas; in 35 areas where only single isolates were identified these were all single strains.

Zuckerman (B. M.). **Relation of type and age of wound to infection by Endoconidiophora fagacearum Bretz.**—*Plant Dis. Reptr*, 38, 4, pp. 290–292, 1954. [Multilithed.]

Greenhouse inoculum studies at Urbana, Illinois, demonstrated that infection of two-year-old oak (*Quercus rubra* and *Q. virginiana*) seedlings by *Endoconidiophora fagacearum* [*Chalara quercina*: *R.A.M.*, 33, p. 326 and preceding and next abstracts] occurred more readily through wounds under 24 hours old than through older ones and through wounded stem surfaces than through wounded leaves. Of the three trees with broken stems inoculated 120 hours after injury, only one became infected. No infection was obtained through wounded buds, wounds left by broken-off buds, or in uninjured trees.

Merek (E. L.) & Fergus (C. L.). **The effect of temperature and relative humidity on the longevity of spores of the Oak wilt fungus.**—*Phytopathology*, 44, 2, pp. 61–64, 1 fig., 1954.

One of the major unsolved problems in connexion with the life-history of *Endoconidiophora fagacearum* [*Chalara quercina*], the oak wilt pathogen [see preceding abstracts], is the mode of long-distance dispersal over land. At the Pennsylvania State College, therefore, the relationship of spore resistance to a wide range of temperature and relative humidity was investigated.

At 95 per cent. relative humidity and a temperature of 37° C. the endoconidia survived less than three days and the ascospores three days, whereas at 25 per cent. humidity both spore forms were still alive after ten. At 24° viability of ascospores was four times as long (232 days) at 10 per cent. as at 95 per cent. humidity. At and below 24° the endoconidia maintained at a humidity of 50 per cent. or less were viable for at least 81 days, their maximum survival period of 173 days occurring at 3° to 9°. Wetting the ascospores at 24° reduced their longevity by half.

Schönhar (S.). **Untersuchungen über die Biologie von Dothichiza populea (Erreger des Pappelrindentodes).** [Studies on the biology of *Dothichiza populea* (agent of Poplar bark canker).]—*Forstw. Zbl.*, 72, pp. 358–368, 4 figs., 1953.

At the Württemberg Forestry Research Institute in 1952–3, inoculation experiments with *Dothichiza populea* [see following abstracts] on greenhouse poplar (*Populus trichocarpa* and *P. regenerata*) plants gave negative results on the leaves and were almost uniformly unsuccessful on non-woody side shoots. However, plants inoculated through stem wounds contracted infection, whether the surrounding tissue was or was not necrotic.

In experiments to determine the relative susceptibility to the pathogen of four species and two hybrids, *P. alba*, *P. alba* × *P. tremula*, and *P. trichocarpa* were more severely attacked than *P. bachelieri*, *P. regenerata*, and *P. generosa* × *P. nigra*.

Van Vloten's observations in Holland as to the enhanced virulence of the fungus during the winter half-year [*R.A.M.*, 33, p. 568] were confirmed by inoculation tests on the above-mentioned species and hybrids. Spring and summer infections are considered unlikely to cause damage except on plants severely weakened by drought.

Müller (R.). **Zur Frage des Pappelrindentodes. Ergebnisse und Folgerungen aus einem Versuch.** [On the question of Poplar bark canker. Results and consequences of an experiment.]—*Schweiz. Z. Forstw.*, 104, 9, pp. 408–428, 7 figs., 1953. [French summary.]

A tabulated account is given of experiments carried out in 1952 at Brühl, near Cologne, Germany, to determine the reason for the virulence of poplar bark canker, associated in part with *Dothichiza populea* [see preceding and next abstracts], in young plantings and nurseries. The test material, consisting of 120 plants each of one-year-old *Populus bachelieri*, one-year-old Rema, two-year-old Leipzig, and two-year-old Harff (*P. regenerata*), was exposed for various periods to sun and wind to reduce its vitality before being surrounded by branches heavily infested with *D. populea* and *Cytospora chrysosperma* [*Valsa sordida*: *R.A.M.*, 33, p. 568].

Leipzig and Rema remained free from infection, while *P. bachelieri* and *P. regenerata* were attacked exclusively by *V. sordida* [cf. 33, p. 388]. It is concluded that *D. populea* is pathogenic only to severely injured trees, especially those that have lost turgidity through long maintenance in trenches. Prior to planting at the earliest possible date (before 20th March in mild localities and 10th April in more exposed situations) trees weakened by this practice should be reconstituted by 48 hours' total immersion in water (preferably running).

Müller (R.). **Weitere Erfahrungen über den Pappelrindentod (Dothichiza populea).** [Further observations on Poplar bark canker (*Dothichiza populea*).]—*Schweiz. Z. Forstw.*, 104, 10, pp. 534–535, 1953.

Commenting on the failure of inoculation experiments with *Dothichiza populea* on poplars in Germany [see preceding abstracts], the author suggests that the varying severity of bark canker from year to year is attributable to weather conditions during the winter and early spring. Thus, temperatures above 0° C. during the dormant period promote the infection of young trees weakened by adverse environmental factors or autumn planting. Once growth has been resumed the risk of infection is probably at an end, since even debilitated trees acquire considerable powers of resistance at this stage.

Bakshi (B. K.). **Wilt of Shisham (Dalbergia sissoo Roxb.) due to Fusarium solani sensu Snyder and Hansen.**—*Nature, Lond.*, 174, 4423, pp. 278–279, 1954.

Most of this information on wilt of shisham (*Dalbergia sissoo*) in Uttar Pradesh caused by *Fusarium solani* has already been noticed from another source [*R.A.M.*, 33, p. 569]. In natural stands seedlings were immune and saplings resistant, while adult, fruit-bearing trees growing in close proximity were susceptible.

Bagchee (K.). **New and noteworthy diseases of forest trees and decay in timber in India.**—*Indian For.*, 80, 7, pp. 373–378, 3 pl., 19 figs., 1954.

Panellus (*Collybia*) *rupicola* appears to be responsible for the decay and death of deodar (*Cedrus deodara*) in the Central Himalayas. Dying 16- to 20-year-old trees were first noticed in 1938 and 1939, and again in 1941 and 1943 in the Chakrata division in the Western Circle, Uttar Pradesh. In 1952 the fungus was observed in Punjab at the base of young deodar poles and on decayed stumps left after removal of some trees which were drying up. Discoloured sunken or blistered cankers exuding resin are present at the base of the trunk. A biological description of the fungus is given in order to facilitate its detection in other deodar forests. In decay tests on chir pine (*Pinus longifolia*) sapwood blocks lost 10·11 per cent. of their weight and heartwood ones 8·71 per cent. in four months at 25° to 26° C.

Timber samples of spruce (probably *Picea morinda*) collected in 1952 from logs found embedded in the bank of the River Kokilamukh, near Jorhat, Assam, and examined at the Forest Research Institute, Dehra Dun, bore a brown cubical rot (caused by *Polyporus palustris*) [cf. *R.A.M.*, 22, p. 506] and decay from which an unidentified species of *Poria* was isolated. Under the influence of the former the wood disintegrated into a pulpy mass, while the latter reduced it to a crumbly mass. Percentage losses in weight of chir sapwood and heartwood blocks in four months were 59·98 and 44·45 for *Polyporus palustris* and 17·65 and 13·97 for *Poria* sp. The former also caused losses of 30·55 and 10·21 in sal (*Shorea robusta*).

Krause (R. L.). **Iron stain from metal fastenings may accelerate decay in some woods.**—*J. For. Prod. Res. Soc.*, 4, 2, pp. 103–111, 2 figs., 2 graphs, 1954.

An investigation of the effect of iron stain on the rate of decay of mahogany (*Swietenia*), white oak (*Quercus alba*), *Liriodendron tulipifera*, *Sequoia sempervirens*, and Sitka spruce was carried out at Madison, Wisconsin, co-operatively by the United States Forest Products Laboratory and the University of Wisconsin. Test blocks of heartwood 2 by $\frac{1}{2}$ by $\frac{3}{4}$ in. were placed between layers of iron nails, sterilized, and left for one month before being placed each with an untreated control in culture flasks of *Lenzites trabea* [*R.A.M.*, 31, p. 361] and *Poria incrassata* [32, p. 461]. Four months after inoculation iron stain had increased decay by both fungi in mahogany, by *P. incrassata* in white oak, and by *L. trabea* in

Liriodendron tulipifera. Iron did not increase decay in the softwoods and appeared to reduce it in spruce and *L. tulipifera* exposed to *P. incrassata*.

Since oak and mahogany were most affected by the presence of iron a second test was carried out using these as samples, with common wire, galvanized, cement coated, and etched nails driven through the blocks to determine the value of anti-corrosion treatments in avoiding possible decay acceleration. In general, iron staining increased decay by *P. incrassata* more than that by *Lenzites trabea*. Some of the oak samples resisted decay considerably, even in the presence of iron. Galvanized nails retarded decay five times out of six.

In the *Swietenia* blocks decay was significantly increased in the presence of iron in five out of six samples with common wire, a similar number with cement coated, and in three out of four with etched nails, while decay in the galvanized nail blocks was 95 per cent. of that in the controls.

Philippine mahogany (*Shorea* sp.) possessed low resistance to the two test fungi, and iron increased decay in four out of six common wire samples, all cement coated, and three out of four etched nails. The galvanized nails increased decay in four out of six samples but retarded it in two.

One sample of African mahogany (*Khaya* sp.) exhibited significant increases in decay by *L. trabea* in the common wire and cement coated nail blocks, while those with galvanized nails showed only half as much decay as the controls.

Further experiments showed that a hot water extract from *Swietenia* was toxic to *P. incrassata* and *L. trabea*, and that the addition of iron (in the form of steel wool) reduced this toxicity. If sufficient iron was used those substances in the extract which were toxic to *P. incrassata* were completely inactivated but not those toxic to *L. trabea*.

Tewari (M. C.) & Pande (J. N.). **Testing of wood preservatives. Part II. Boliden salts.**—*Indian For.*, 80, 8, pp. 480–485, 1954.

Further field and laboratory experiments in this series were carried out at the Forest Research Institute, Dehra Dun, India [cf. *R.A.M.*, 32, p. 53], to test the preservative S 25, a recent formulation of Boliden salt [33, p. 192] containing arsenic, zinc, copper, and chromium. Leaching tests on chir (*Pinus longifolia*) blocks one week after treatment showed that copper sulphate was almost completely fixed; of the arsenic pentoxide, 1·3 to 1·81 per cent. was leached from specimens treated with 6·035 per cent. S 25 solution, but none when the concentration was halved; zinc sulphate was heavily leached (15 to 20 per cent.) when the preservative was applied at 3·017 per cent.; while 5 to 10 per cent. of the sodium dichromate was leached out under all conditions.

Both copper and chromium were completely fixed in sal (*Shorea robusta*) blocks under all conditions; 3 and 7 per cent. of the arsenic was leached at the higher and lower concentrations respectively, and 41·38 per cent. zinc at the lower.

In field trials, sticks and poles 2 ft. long and 6-in. veneers of sal, chir, and semul (*Bombax malabaricum*) treated with 2 and 4 per cent. solutions of the preservative were all sound after one year's exposure, while the untreated were destroyed.

The cost of the preservative is about Rs. 147 per cwt.

Colley (R. H.). **Correlating evaluation tests of wood preservatives.**—*J. For. Prod. Res. Soc.*, 4, 1, pp. 43–51, 1954.

A programme for evaluating wood preservatives is outlined, involving laboratory (soil-block) tests [see following abstracts] and test plot exposures of small stakes and round posts, supplemented where possible by documented service tests of treated commercial units. Plans for the co-ordination of such tests with a view to correlating the results are discussed.

Snoke (L. R.). **Soil-block bioassay of a creosote containing pentachlorophenol.**—*J. For. Prod. Res. Soc.*, 4, 1, pp. 55–57, 1954.

In soil-block tests [see preceding and next abstracts] at the Bell Telephone Laboratories, Murray Hill, New Jersey, the addition of 2·16 per cent. pentachlorophenol increased the effectiveness of creosote No. 9 by about 50 to 60 per cent. against the test fungus *Lentinus lepideus* (Madison 534) [*R.A.M.*, 32, p. 159] and by 20 to 25 per cent. against *Lenzites trabea* (Madison 617) [loc. cit. and above, p. 695].

Snoke (L. R.). **Observations on a possible method of predicting soil-block bioassay thresholds by distillation characteristics of the weathered creosotes.**—*J. For. Prod. Res. Soc.*, 4, 2, pp. 111–114, 1954.

Data are presented to demonstrate a correlation between the calculated threshold based on 2·5 lb. of residual creosote boiling below 355° C. in each cu. ft. of wood and the threshold observed in soil-block bioassays with *Lentinus lepideus* (Madison 534) [see preceding abstract]. If, after further experimental work, other creosote fractions exhibit similar correlations it should be possible to estimate creosote thresholds in terms of Madison 534 by determining the initial retention which assures 2·5 lb. remaining after 60 days weathering.

Campbell (L.). **Fungicidal control of club root of Cauliflower.**—*Plant. Dis. Reptr*, 38, 4, pp. 283–285, 1 fig., 1954. [Multilithed.]

None of the ten fungicides tested in the field at Puyalup, Washington, in 1953 against cauliflower club root (*Plasmodiophora brassicae*) [*R.A.M.*, 33, p. 459] gave complete control of the disease. Mathieson 275 (pentachloronitrobenzene) at 20, 40, and 60 lb. per acre, rototilled into the soil to a depth of 4 to 6 in. in 15 in. wide strips one week before planting, reduced the disease rating by 64·8, 68·1, and 69·2 per cent., respectively, and increased yields by 130·4, 177·1, and 214·9 per cent., respectively. Practically all the cauliflower heads from the treated rows were marketable, compared with none from the untreated. At the two higher concentrations the fungicide was also effective against annual weeds. It cannot, however, be recommended for use in western Washington until officially approved.

Maier (W.). **Bormangelkrankheit an Blumenkohl (Brassica oleracea L. var. botrytis L.) und Kohlrabi (Brassica oleracea L. var. gongylodes L.).** [Boron deficiency disease of Cauliflower (*Brassica oleracea* L. var. *botrytis* L.) and Kohlrabi (*Brassica oleracea* L. var. *gongylodes* L.).]—*Angew. Bot.*, 26, 1, pp. 3–12, 7 figs., 1951. [Received August, 1954.]

The symptoms of boron deficiency in cauliflower and kohlrabi [*R.A.M.*, 21, p. 510] are described from the Phytopathological Institute, Geisenheim-am-Rhein, Germany. In the plots without boron 37·4 per cent. of the kohlrabi split compared with only 6·8 in those supplied with borax at 4 gm. per sq. m. Soil amendments with borax at the same rate resulted in the production of healthy cauliflowers.

Sheijgrond (W.) & Vos (H.). **Investigation on the susceptibility to club root.**—*Euphytica*, 3, 2, pp. 125–139, 9 figs., 1954. [Dutch summary.]

Turnips, which are frequently grown as catch crops in many parts of the Netherlands, are subject to severe damage by club root (*Plasmodiophora brassicae*) [*R.A.M.*, 26, p. 370; cf. 33, p. 587], the yield reductions on badly infested plots ranging from 35 to 80 per cent. according to the method of calculation. Crops and varieties with abundant foliage suffer a smaller reduction than those with equal infection but a smaller leaf area. Of the various turnip types tested 'half-long green top yellow', 'half-long purple top white', 'flat round yellow', and 'round yellow-fleshed' were the least susceptible. The greatest variation in susceptibility

appeared to exist within the 'half-long purple top white' group to which the principal Dutch varieties belong. The foreign varieties Meetjeslander and Waaslander from Belgium, and Weibulls Immuna II [29, p. 71] and Östersundom, hitherto regarded as resistant, suffered 24, 20, 76 and 92 per cent. plants attacked, respectively, and a long purple top white, used for comparison, 85 per cent. The results of some of the trials suggested the existence of several physiologic strains of *P. brassicae* within the crop.

Trials to determine the susceptibility of various fodder crops revealed that contrary to previous findings [cf. 22, p. 40] Chinese radish (*Raphanus sativus* var. *niger*) is not immune, 20 per cent. of the plants being damaged.

Borges (Maria de L. V.). **Alterações respiratórias em 'Brassica chinensis' L. devidas ao virus do mosaico amarelo do Nabo.** [Respiratory changes in *Brassica chinensis* L. due to Turnip yellow mosaic virus.]—*Bull. Soc. portug. Sci. nat.*, Sér. 2, 4 (19), 2, pp. 270–271, 1953.

Measurements by the Warburg direct method [at the National Agronomic Institute, Sacavém, Portugal] demonstrated the increase caused by turnip yellow mosaic virus in the quantities of oxygen absorbed by *Brassica chinensis* leaves [*R.A.M.*, 33, p. 516]. The action of the virus in inoculated leaves begins at a very early stage, even before symptom development, but reaches a climax (the increase averaging 50 per cent.) after 30 days, when mosaic is apparent, and thereafter falls to approximately the normal rate.

Lüdecke (H.). **Magnesium-Mangel bei Zuckerrüben.** [Magnesium deficiency in Sugar Beets.]—*Zucker*, 6, 19, p. 437, 2 figs., 1953.

Control of magnesium deficiency in sugar beets [*R.A.M.*, 25, p. 532; 28, p. 610, *et passim*], the prevalence of which in Germany varies from year to year, may be accomplished (if the symptoms are recognized in time) by soil amendments with finely divided magnesium oxide (20 kg. per ha.) or magnesium sulphate (60 to 100 kg.). More rapid results may be obtained by spraying with 1 per cent. magnesium sulphate. Where the disorder occurs repeatedly on the same site, only magnesium-containing lime should be used and one-third of the potassium fertilizer applied in synthetic form.

Miller (P. R.). **Sugar Beet curly top virus and curly-top disease in the United States.**—*F.A.O. Pl. Prot. Bull.*, 2, 6, pp. 86–88, 1954.

Most of this information on curly top virus of sugar beet in the United States has been noticed from another source [*R.A.M.*, 33, p. 516]. In Cook county just north of Chicago the virus was recovered from sugar beets in August, and typical symptoms were observed in October, 5 per cent. of the plants being affected in some fields. In others, though typical symptoms were not observed, many plants had curled young leaves without vein clearing or enlargement; the vector (*Circulifer tenellus*) [*Eutettix tenella*] was present in these fields. Cucumber plants adjacent to horse-radishes in Madison county, Illinois [loc. cit.], also displayed symptoms suggestive of curly top.

Gypsophila paniculata double and single, *Gaillardia aristata* variety Portala, *Scabiosa caucasica* House's Giant, *Kniphofia uvaria*, *Statice latifolia*, *Pentstemon barbatus*, and *Chrysanthemum parthenium* Snowball are recommended as resistant ornamentals for planting in southern New Mexico, where curly top virus has caused appreciable losses in the last decade.

Sappenfield (W. P.). **A new physiologic race of Bean rust (Uromyces phaseoli typica) from New Mexico.**—*Plant Dis. Reptr*, 38, 4, p. 282, 1954. [Multilithed.]

A new physiologic race of bean rust (*Uromyces phaseoli* var. *typica*) [*U. appendi-*

culatus: *R.A.M.*, 31, p. 467], tentatively named No. 31, was collected in 1952 on Pinto beans [*Phaseolus vulgaris*] from the Deming and State College areas of New Mexico. Race 30 was also found in the Deming area and races 6 and 27 in the Estancia Valley.

YARWOOD (C. E.). **Resistance of Bean leaf pulvini to fungi and viruses.**—*Phytopathology*, 44, 2, p. 64, 1954.

At the University of California, Berkeley, the pulvini of the Pinto, Creaseback, and White Blue Lake bean [*Phaseolus vulgaris*] varieties were resistant to inoculation with *Erysiphe polygoni*, *Uromyces phaseoli* [*U. appendiculatus*: *R.A.M.*, 33, p. 573], *Colletotrichum lindemuthianum* [33, p. 495], and the viruses of tobacco mosaic, tobacco necrosis [33, p. 4], southern bean mosaic, and lucerne mosaic, whereas the petioles and laminae of the same leaves were very susceptible. On the other hand, tobacco ring spot virus injured the pulvinus as severely as the petiole and lamina in all three varieties.

Spores of the fungi germinated about equally well in aqueous extracts of the pulvini, petioles, and laminae of Pinto bean.

LEACH (L. D.), LANGE (W. H.), HILLS (F. J.), & KENDRICK (J. B.). **Lima Bean seed treatment trials in California, 1950–52.**—*Plant Dis. Reptr*, 38, 3, pp. 193–199, 1954. [Multilithed.]

From 1950 to 1952, inclusive, 33 field trials were carried out at the University of California Farm to determine the efficiency of certain combined fungicide-insecticide seed treatments on Fordhook and Ventura Lima beans [*Phaseolus lunatus*]. Arasan SF at $1\frac{1}{3}$ oz. per 100 lb. seed and vancide 51 (4 oz.) appeared superior to spergon SL (2 oz.) in protecting against [unspecified] seed decay organisms [*R.A.M.*, 24, p. 44; 33, p. 602]. Emergence was greatly reduced by treatment with insecticide (lindane, aldrin, or dieldrin) alone, but little or no damage occurred when it was combined with a fungicide. Lindane (75 per cent.) caused less damage at $\frac{1}{6}$ oz. per 100 lb. seed than at $\frac{1}{3}$ oz.; the higher rate was, however, more adequate for heavier infestations and gave satisfactory results in combined treatments.

DESJARDINS (P. R.), LATTERELL (R. L.), & MITCHELL (J. E.). **Seed transmission of Tobacco-ringspot virus in Lincoln variety of Soybean.**—*Phytopathology*, 44, 2, p. 86, 1 fig., 1954.

The results of experiments at the Department of the Army, Chemical Corps, Washington 25, D.C., demonstrated that tobacco ring spot virus, the agent of bud blight in soy-bean [*R.A.M.*, 25, p. 484], was transmitted through infected seeds of the Lincoln variety in 78 per cent. of a planting made in the autumn of 1951 and in 54 per cent. of another sown in the late spring of 1952, when the higher prevailing temperatures apparently suppressed the typical symptoms. There appeared to be no accidental infection and seed transmission is, therefore, presumed.

New Lee Soybean.—*Seed World*, 74, 12, p. 27, 1954.

Lee, a new soy-bean variety developed by the United States Regional Soybean Laboratory and 12 experiment stations of the south-eastern States from a cross made in 1944 between S-100 (a popular mid-western variety) and CNS [*R.A.M.*, 29, p. 550; 31, p. 163], is reported to be resistant to bacterial pustule [*Xanthomonas phaseoli* var. *sojense*: loc. cit.; 33, p. 64], wildfire [*Pseudomonas tabacum*: loc. cit.], frog-eye [*Cercospora sojina*: 33, p. 402], and purple seed stain [*C. kikuchii*: 33, p. 462]. The variety has given outstanding performances in tests over three years.

Weber (P. V. V.), Younkin (S. G.), & Merwarth (F. L.). **Fungicidal control of Alternaria blight of Carrots.**—Abs. in *Phytopathology*, 44, 2, p. 112, 1954.

Alternaria dauci is a common source of severe damage to carrots in parts of eastern Pennsylvania and may be detrimental to the crop in New Jersey [cf. *R.A.M.*, 31, p. 164]. Fungicidal treatments [cf. 33, p. 401] with manzate and zineb, used at the recommended concentrations and applied eight times at the rate of 150 gals. per acre, beginning at the first appearance of leaf spot and continuing at 10-day intervals until a fortnight or so before harvest, resulted in yield increases of 7 to 8 and 5 to 6 tons per acre, respectively. Defoliation in the sprayed plots was assessed at 38 and 41 per cent., respectively, compared with 79 per cent. in the untreated. Other fungicides, including a fixed copper (which caused excessive foliar yellowing), proved inferior to manzate and zineb in the control of *A. dauci*.

Yarwood (C. E.). **Tobacco necrosis virus on Lettuce.**—*Plant Dis. Reptr*, 38, 4, p. 263, 1954. [Multilithed.]

Big vein is an important disease of lettuce in California [*R.A.M.*, 28, p. 109], where tobacco necrosis virus [32, p. 359] has not been reported on any field crop. In tests at the Department of Plant Pathology, University of California, Berkeley, lesions similar to those caused by Fulton's strain A of tobacco necrosis virus [cf. 29, p. 539] were formed on cowpea and Pinto bean [*Phaseolus vulgaris*] inoculated with sap from healthy and diseased lettuces. Although the lesions appeared frequently in transmissions from big vein plants, no causal relation was established between the virus and the disease.

Basile (Rita). **Associazione di Sclerotinia sp. e Pythium sp. in un marciume dell'Insalata (Lactuca sativa).** [Association of *Sclerotinia* sp. and *Pythium* sp. in a rot of Lettuce (*Lactuca sativa*).]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 10 (*1952*), pp. 39–44, 6 figs., 1953. [English summary.]

This paper on infection of lettuces in Italy by *Botrytis* sp. in association with *Pythium* sp. has already been noticed from another source [*R.A.M.*, 31, p. 530].

Pettinari (Carla). **Phyllosticta multiformis n.sp. su foglie di Lactuca scariola L.** [*Phyllosticta multiformis* n.sp. on leaves of *Lactuca scariola* L.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 10 (*1952*), pp. 23–29, 2 pl., 1953. [English summary.]

This account of *Phyllosticta multiformis* on *Lactuca scariola* [*L. serriola*] in Italy has already been noticed from another source [*R.A.M.*, 31, p. 530].

Late reports on newer varieties.—*Seed World*, 75, 1, pp. 27, 37, 1954.

Ohio MR 25, a new pickling cucumber variety with high tolerance of cucumber mosaic virus [*R.A.M.*, 32, p. 231] and angular leaf spot [*Pseudomonas lacrymans*: 31, pp. 290, 472; 33, p. 520] is reported from Ohio Agricultural Experiment Station. In trials it produced 40 to 50 per cent. more yield than the current varieties, almost half of the crop coming during the last three weeks of the growing season when mosaic is usually most severe. It is recommended as suitable for the home garden.

Vidal (J.-L.). **I. Sur l'absorption de solutions salines par les feuilles de la Vigne à propos de l'emploi de bouillie bordelaise au nitrate de cuivre. II. Des effets particuliers sur la Vigne de pulvérisations contre le mildiou avec bouillies au nitrate de cuivre en substitution de bouillies au sulfate de cuivre.** [I. The absorption of saline solutions by Vine leaves with reference to the use of Bordeaux mixture containing copper nitrate. II. Some specific effects of

spraying Vines against mildew with mixtures containing copper nitrate instead of copper sulphate.]—*C.R. Acad. Agric. Fr.*, 39, 5, pp. 273–281, 1 graph, 1953.

Field experiments were conducted on Saint-Émilion vines grafted on Téléki 5BB in which the normal Bordeaux applications (0·5 per cent. copper), commencing on 10th May, containing copper sulphate were compared with Bordeaux mixture containing copper nitrate [*R.A.M.*, 30, p. 557]. Other sprays were also applied. The copper nitrate mixture gave a degree of protection against mildew [*Plasmopara viticola*: 33, p. 277] at least as good as that given by copper sulphate, the average number of lesions per plant on 22nd July being 2·827 and 3·336, respectively. T.P. 13 was best with 0·46 and dithane Z 78 next with 2·18 lesions. The copper nitrate sprays also gave increased yields, supplied a nitrogen source absorbed partially by the leaves, and helped to cure lime-induced chlorosis [33, p. 11]. Severe lime-induced chlorosis was prevented by sprays of potassium nitrate on Saint-Émilion vines in pots.

Huglin (P.). **Remarques sur les fongicides organiques expérimentés dans les vignobles alsaciens au cours de l'année 1952.** [Observations on the organic fungicides tested in Alsatian vineyards during the year 1952.]—*Progr. agric. vitic.*, 139, 9–10, pp. 123–125, 1953.

During 1952 Chasselas vines in Alsace sprayed four times with Bordeaux mixture at 1, 2, and 4 per cent. developed significantly less infection by *Oidium* [*Uncinula necator*: *R.A.M.*, 32, pp. 9, 362; 33, p. 578] than those treated with dithane Z-78 at 0·15, 0·3, or 0·6 per cent. or with captan at 0·5, 1, or 2 per cent. Captan at 1 and 2 per cent. gave significantly better control than the 0·5 per cent. and all three concentrations of dithane Z-78.

Locally, vines (especially Gewürtzraminer and Riesling) often suffer important losses due to stalk rot caused by *Botrytis cinerea* [23, p. 206; 33, p. 521, and next abstract]; over 50 per cent. of the bunches may be affected, particularly those of Riesling. Gewürtzraminer vines at Ribeauvillé sprayed early in September before the disease appeared with 0·5 per cent. dithane Z-78, 1 per cent. captan, 0·5 per cent. copper oxychloride, and 1 per cent. Bordeaux mixture developed, respectively, 13·4, 4·8, 15·8, and 7·8 per cent. affected bunches in one test, 6·2, 4·1, 6·5, and 6·4 per cent. in a second, and 16·8, 9·4, 11, and 19·3 per cent. in a third, the figures for the untreated being 15·9, 11·2 and 26·3 per cent. in the three tests, respectively. The results given by 1 per cent. captan were outstanding.

Malan (H.). **Long-term storage of Grapes.**—*Fmg in S. Afr.*, 29, 335, pp. 157–159, 3 graphs, 1954.

In investigations at the Western Province Research Station, Stellenbosch, South Africa, Waltham Cross grapes were stored successfully [*R.A.M.*, 32, pp. 468, 606] for three months at 31° F. in an atmosphere containing 20 p.p.m. sulphur dioxide, the only sign of deterioration being a slight desiccation of the stems. Wastage, due chiefly to *Botrytis cinerea* [see preceding abstract], was unimportant provided that the grapes were sound to begin with and the gas concentration was controlled properly. Peach trays were found to be preferable to lug boxes for prolonged storage.

Huertos (M. R.). **Rapid extraction of intact crystalline inclusions from the cells of plants infected with Tobacco mosaic virus.**—*Nature, Lond.*, 174, 4424, p. 313, 2 figs., 1954.

In studies at the Laboratorium voor Bloembollenonderzoek, Lisse, Holland, during 1950, the author extracted intact intracellular inclusions formed by the viruses of cabbage black ring spot, cauliflower mosaic, severe etch [strain of tobacco

etch], henbane mosaic, and tomato aucuba mosaic [strain of tobacco mosaic]. The rapid extraction of the more fragile tobacco mosaic virus inclusions has been effected by immersing strips of infected tobacco epidermis in Carnoy's fluid for three or four minutes, rinsing in 96 per cent. alcohol, transferring to distilled water, and dissecting out with fine needles. The inclusions can be preserved in 96 per cent. alcohol for a year at least. Electron micrographs of preparations obtained by this method show clearly the arrangement of the virus particles.

Miličić (D.). **Viruskörper und Zellteilungsanomalien in Opuntia brasiliensis.** [Virus bodies and cell division anomalies in *Opuntia brasiliensis*.]—*Protoplasma*, 42, 3, pp. 228–236, 6 figs., 1953.

An examination at the Botanical Institute, University of Zagreb, Yugoslavia, of cladodes and leaves of *Opuntia brasiliensis* revealed numerous fusiform and variably shaped protein bodies in the cytoplasm of the epidermis. Some cells also contained nuclear crystalloids presenting many analogies with the protein bodies. All the structures are considered to be virus elements [cf. *R.A.M.*, 33, p. 406 and next abstract], to which anomalies in the cell divisions in the mature cladodes are attributed.

Weber (F.). **Kakteen-Virus-Übertragung durch Propfung.** [Transmission of the Cactaceae virus by grafting.]—*Protoplasma*, 42, 3, pp. 29–31, 2 figs., 1953.

After a year of union a normal scion of *Opuntia kleiniae* grafted at the Institute of Plant Physiology, Graz, Austria, on a stock of *O. subulata* with protein spindles in its leaves was found to contain similar bodies, which are interpreted as being of virus origin [cf. preceding abstract].

Bawden (F. C.) & Kassanis (B.). **Some effects of thiouracil on virus-infected plants.**—*J. gen. Microbiol.*, 10, 1, pp. 160–173, 1 pl., 1954.

Some of the information in this paper on the rate of virus multiplication in inoculated leaves at Rothamsted Experimental Station has been noticed from another source [cf. *R.A.M.*, 33, p. 585]. Multiplication was checked most when the leaves contained little virus and was resumed when the thiouracil was removed. The latter impeded the multiplication in tobacco of all the viruses tested, namely, tobacco mosaic, tomato aucuba [tobacco] mosaic, the Rothamsted culture of tobacco necrosis virus, potato virus Y, and henbane mosaic, but not of tobacco necrosis in French bean (*Phaseolus vulgaris*) or broad bean mottle in broad bean; the last-named developed necrotic lesions [cf. above, p. 690]. Thiouracil prevented infection in both tobacco and *P. vulgaris* when mixed with inocula and also affected adversely the growth and appearance of both plants. Unlike the impeding of virus multiplication in tobacco, however, these effects were not counteracted by excess uracil.

Best (R. J.). **The development and multiplication of viruses.**—*J. Aust. Inst. agric. Sci.*, 20, 1, pp. 36–40, 1 diag., 1954.

In this paper, presented at a symposium held at the Waite Institute, Adelaide, on 25th September, 1953, the author critically reviews and discusses the present state of knowledge (with 11 references) of the development and multiplication of viruses, the points dealt with including the composition of viruses, bacterial viruses, and plant viruses (latent period and anti-metabolic action, and transformations *in vivo*). His observations showed that when a mild strain of tomato spotted wilt virus [*R.A.M.*, 33, p. 642] protects plants against a severer strain inoculated later, the latter still exercises a strong influence on the plant, which can best be explained by assuming that the severe strain multiplies in a form whose symptom expression is greatly moderated. Even when the severe strain is inocu-

lated simultaneously with one or more milder strains the plants do not develop the severest symptoms, even though the severe strain moves faster than the others. Some of the visible symptoms on plants inoculated with a mixture of strains A and E [32, p. 648] are those usually characteristic of the strains; others are not usually shown by either alone. When these latter are 'sub-cultured', they behave like new strains. The most severe character of A has never appeared in plants inoculated with a mixture of strains including A.

The hypothesis is put forward that at some early stage in the multiplication process the viruses, whether inoculated at different times or together, exchange character determinants. It seems probable that the basic processes involved in the latent period and during recombination are common to plant, animal, and bacterial viruses. There is strong evidence that the ultimate genetic unit responsible for replication may be the nucleic acid itself.

GRIEVE (B. J.). **Viruses and physiology of the host plant.**—*Rep. Aust. Ass. Adv. Sci., 1951*, pp. 102–114, 1951.

In this presidential address to the Botany section the author reviews the work and literature on plant viruses in Australia [see preceding abstract] for the last half-century. The address deals in particular with the entry and movement of viruses and their effect of respiration and growth. A bibliography of 104 titles is appended.

GENDRON (Y.) & KASSANIS (B.). **The importance of the host species in determining the action of virus inhibitors.**—*Ann. appl. Biol.*, 41, 1, pp. 183–188, 1954.

In work carried out at Rothamsted Experimental Station to ascertain whether the virus-inhibiting ability of substances present in the leaves of plants [cf. *R.A.M.*, 32, p. 364 and next abstract] depends on the species of plant inoculated or on the type of virus, sap from sugar beet and *Datura tatula* was mixed with the viruses of cucumber mosaic, tobacco necrosis, and tomato bushy stunt and tested on French bean (*Phaseolus vulgaris*), sugar beet, and *D. tatula*. Infection with all three viruses was affected by sap from both species, but the degree to which it was inhibited depended entirely on the species of plant inoculated. Sap from each species greatly reduced the numbers of lesions developing on bean, but not on its own host; *D. tatula* sap reduced those on sugar beet, and sugar beet sap those on *D. tatula*. The tests also showed that, when concentrated mixtures of inhibitors and viruses are diluted, infectivity, as compared with that of comparably diluted control virus preparations, increases; on the other hand, when mixtures of viruses with sugar beet or *D. tatula* sap were inoculated in various dilutions to the host providing the sap, the number of lesions produced at different dilutions closely agreed with that of the control.

Mixtures of tomato bushy stunt or tomato aucuba [tobacco] mosaic viruses with sap from *Phytolacca decandra*, sugar beet, cucumber, and dahlia, or with the polysaccharide from *Trichothecium roseum* [cf. 33, p. 585], were tested on tobacco, *Nicotiana glutinosa*, cucumber, and *D. tatula*. No inhibitor was effective in preventing infection of all the species equally, and all were less effective on cucumber than on the other hosts. The polysaccharide was less effective with tobacco than with *N. glutinosa*. In a further experiment with tomato aucuba mosaic virus and the polysaccharide the average numbers of lesions per half-leaf of tobacco, *N. glutinosa*, and a hybrid between them were 44, 6, and 7, respectively, compared with 49, 39, and 30 for a mixture of the virus with water. The hybrid evidently inherited from *N. glutinosa* sensitivity to the inhibitor from *T. roseum*.

These results agree with the view that inhibitors work by so affecting the physiology of the host that introduced virus particles do not become established and

multiply, or do not multiply sufficiently to form visible lesions. As cucumber was more readily infected by mixtures of viruses and inhibitors than any of the other test plants, it is recommended as an alternative host for viruses difficult to transmit mechanically.

HENNER (J.). **Zur Frage der Peronosporabekämpfung im Weinbau mit organischen Fungiziden und Kupferfertigpräparaten.** [The problem of *Peronospora* control in viticulture with organic fungicides and proprietary copper preparations.]—*Pflanzenarzt*, 7, 6, pp. 1–3, 1954.

In 1953, a year of high incidence of downy mildew (*Peronospora*) [*Plasmopara viticola*: *R.A.M.*, 33, p. 579] in Austria, Grüne Veltliner vines were sprayed at the field stations of the Austrian Federal Institute for Plant Protection at Langenlois and Mistelbach with 1·5 per cent. Bordeaux mixture, 0·3 per cent. captan, 0·5 and 0·75 per cent. coprantol P (copper oxychloride), and other fungicides in one pre- and four post-blossom sprays [cf. above, p. 701].

Whereas the crop from untreated vines was an almost complete loss, normal, satisfactory control was achieved with Bordeaux mixture, and even better results with captan. Two organic thiocarbamate preparations showed promise. Of the proprietary copper preparations only the 0·75 per cent. coprantol P gave adequate protection.

SAPONARO (ANNA). **Prove di trattamenti estintivi contro la Peronospora della Vite.** [Tests of eradicant treatments against *Peronospora* of the Vine.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 10 (*1952*), pp. 189–195, 1 diag., 1953. [English summary.]

In an experiment carried out at the Plant Pathology Station, Rome, on the control of vine mildew (*Plasmopara viticola*) [*R.A.M.*, 33, p. 579] by an eradicant treatment of fallen infected leaves [16, p. 152], the floor of the vineyard was sprayed on 16th April, 1953, with 1 per cent. ibertox (triethanolamino dinitrobutylphenol) at 2 l. per sq. m., and dug over five or six days later. The soil under the outermost row of five vines remained unsprayed. On 5th June this row had 30 infected leaves; 30 m. away, the first of the sprayed rows, each consisting of 24 plants, had ten; the second sprayed row (10 m. from the first) had one; rows three to eight had no infection. The experiment is to be repeated on a larger scale later.

SAPONARO (ANNA). **Ricerche sulla morfologia di alcuni ceppi di Botrytis cinerea Pers. provenienti da località diverse dell' Italia.** [Researches on the morphology of some strains of *Botrytis cinerea* Pers. originating in various localities in Italy.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 10 (*1952*), pp. 213–231, 3 pl., 5 graphs, 1953. [English summary.]

Statistical analysis of the conidial dimensions in culture of seven strains of *Botrytis cinerea* found on grapes in various parts of Italy demonstrated the existence of distinct morphological races. One strain gave rise to a variant sector.

In view of the known ability of *B. cinerea* to modify the chemical composition of grape must, the discovery of morphological races of the fungus may, possibly, prove of importance in practical wine-making.

JACKS (H.). **Plant quarantine. III. List of plant diseases and pests intercepted in New Zealand in 1953.**—*N.Z. J. Sci. Tech.*, Sect. A, 35, 6, pp. 555–557, 1954.

Leaf spot (*Elsinoe venezuelensis*) on *Croton* plants from the Norfolk Islands was among the diseases intercepted on plants and plant products introduced into New Zealand in 1953 [cf. *R.A.M.*, 33, p. 406].

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